Sampling and Analysis Plan
17th Street Dinneen Properties

Brownfields Petroleum and Hazardous Substance Assessment
Cheyenne - West Edge
City of Cheyenne
Cheyenne, Wyoming

Cooperative Agreement
BF–96807601-0
Awarded September 8, 2011

Prepared for:

Mr. Matt Ashby
City of Cheyenne
2101 O'Neil Avenue
Cheyenne, WY 82001

September 2013

Sampling and Analysis Plan
17th Street Dinneen Properties

Brownfield Petroleum and Hazardous Substance Site Assessment
Cheyenne - West Edge
City of Cheyenne
Cheyenne, Wyoming

Revision #0

Prepared for:

Mr. Matt Ashby
City of Cheyenne
2101 O'Neil Avenue
Cheyenne, WY 82001

AYRES ASSOCIATES
5201 E. Terrace Drive, Suite 200
Madison, WI 53718
608.443.1200 • Fax: 608.443.1250
www.AyresAssociates.com

Ayres Associates Project No. 19-0325.50
File: v:\env\final\19032550\17 street dinneen property sap.docxv:\env\final\19032550\17 street dinneen property sap.docx

Contents

List of Tables

List of Figures

1.0 Introduction

This document presents the Sampling and Analysis Plan (SAP) for the assessment to be performed for the Cheyenne - West Edge Brownfield Assessment project located in the City of Cheyenne, Wyoming. Assessment activities will be conducted using a USEPA Brownfield Petroleum and Hazardous Substance Site Assessment Grant (BF – 96807601-0). This SAP specifically covers the contiguous Dinneen properties located at 1620 Pioneer Avenue, 517 West 17th Street, and 1618 O'Neil Avenue, Cheyenne Wyoming.

The SAP, prepared in general accordance with WDEQ Fact Sheet #29, outlines the policy and organizational structure for completing the assessment, describes the rationale and approach to the project, summarizes the tasks to be performed, and outlines the schedule for implementing the assessment. The SAP outlines the objectives of the sampling program and describe in detail the activities and sampling procedures to be used during the project. Changes required in the procedures described in this SAP due to site conditions, or other constraints, will be properly documented in the site logbook. Significant changes to the SAP, such as the addition or deletion of tasks, will be detailed in a technical memorandum to the client and EPA.

2.0 Project Background

The City of Cheyenne and Laramie County conducted an extensive planning and public participation process that culminated in the adoption of the 2006 Cheyenne area master plan (PlanCheyenne). The presence of brownfield sites inhibits the goals set forth in the plan by limiting business and growth and undermining the economy. Additionally, the brownfield sites contribute to deterioration of water quality from runoff into adjacent surface water bodies and groundwater.

The City of Cheyenne applied for and received a USEPA Brownfield Hazardous Substance and Petroleum Site Assessment Grant in 2011. The purpose of the grant is to perform assessment activities at specific sites in the project corridor where environmental assessment is incomplete, or has not been performed. The grants will also be used to prepare a remedial action plan for selected sites in the project corridor. The USEPA awarded the City a $1,000,000 hazardous substances and petroleum assessment grant on September 8, 2011. The project grant period ends September 30, 2014.

The City's planning efforts identified priority sites for redevelopment based on redevelopment potential and ability to achieve the City's goals for the area known as West Edge/Lower Capitol Basin. Many of Cheyenne's brownfields are concentrated in older industrial, commercial, and transportation corridors within the Lower Capitol Basin. Therefore, Cheyenne is focusing their efforts on five priority areas within the downtown core. Three of the priority sites, known as the Dinneen properties, are located along W. 17th Street.

The City of Cheyenne retained Ayres Associates to perform environmental assessment activities and assist the City in implementing the requirements of the grants. Environmental assessment and remediation planning activities, and project management services related to the assessment grants and site development activities, are the subjects of this SAP.

3.0 Initial Evaluation

Site Location and Description

The project sites are located in the south ½ of Section 31, Township 13 North, Range 66 West (S ½, Section 31, T13N, R66W), Laramie County, Wyoming. The three properties are each bounded by W. 17th Street to the north. The locations of the parcels are shown on Figure 1.

Site History and Background

The history of the project area was substantially obtained from *Phase I Environmental Assessment Reports* (July 2013), prepared by Ayres Associates Inc. The history of the 1620 Pioneer Avenue site was obtained from a *Phase I Environmental Assessment Report* (November 2010), prepared by Terracon Consultants.

Dinneen Property – 1620 Pioneer Avenue

Based on review of the historical information, the site has been extensively developed since at least the 1880s. Historical site uses have included potential dry cleaning operations (three separate Chinese laundry facilities and the Geyser Steam Laundry facility), numerous automotive repair shops and auto body shops (including the main Dinneen building), a former gas station at the main Dinneen Motors building, at least one other historic UST on the site (and another UST possibly on the south edge of the site or immediately south of the site), and other industrial operations (painting and varnishing, sign painting, paint storage, sheet metal works). In addition, numerous historical sites were identified on adjoining properties in all directions that could cause environmental impairment.

The immediately adjacent and surrounding properties have been used historically for mixed purposes, including commercial and residential. Increased commercial business development began occurring in the 1930's. Historic property use adjacent to and surrounding the subject property include several laundromats/dry cleaners, painting companies and paint storage, hide and fur companies, bulk oil storage, filling stations, various automotive service/repair facilities, printing businesses, and solvent storage tank areas. The railroad has also existed approximately two blocks south throughout the history of the subject property.

In August 2010, Terracon Consultants, Inc. conducted limited soil sampling inside the Main Building's first floor shop area, where the concrete had been removed and the former lift cylinders, hydraulic fluid tanks, and sumps had been removed. Based on results of this assessment, the property owner, Dinco Land, Inc. entered into a Preliminary Remediation Agreement (PRA) with DEQ on February 22, 2011. Additional assessment activities were performed at the site by Terracon in March 2011, including:

- An ecological risk assessment;
- Additional site characterization activities;

- Quarterly groundwater monitoring;
- Developed soil and groundwater management plan for use during site construction activities;
- Abandoned monitoring wells located in planned construction areas;
- Performed soil over-excavation, confirmatory sampling, and waste characterization in areas where construction was planned and soil contamination was already known or suspected to exist; and
- Designed vapor mitigation systems for former shop area of Main Building and planned addition to Main Building.

Results of these activities are presented in Terracon's Voluntary Remediation Program Report dated September 15, 2011.

Dinneen Property – 517 W. 17th Street

Based upon a review of available historical data, the subject property has been developed with mixed business use including a livery, hotel, livestock feed sales and supply, auto storage, and a machinery company known as the Wortham Machinery Company. According to Sanborn Maps and City Directories, the Wortham Machinery Company occupied the subject property from circa 1960 to 2002. Prior to 1960, the subject property transitioned from a horse corral/livery, livestock feed supplier, and a hotel in the late 19th and early 20th centuries to an auto storage facility in the 1930's until its occupancy of a machinery company circa 1960. Details of the former auto storage facility are unknown. According the Mr. Dinneen (property owner), the Wortham Machinery Company operated as heavy equipment distributor and maintenance business until the 1950's. Mr. Dinneen did not know the nature of the business post 1950, but believed it to involve general machinery maintenance. Machinery operations ceased around the 1990's and the building remained vacant until it was razed in 2010.

The immediately adjacent and surrounding properties have been used historically for mixed purposes, including commercial and residential. Increased commercial business development began occurring in the 1930's. Historic property use adjacent to and surrounding the subject property include several laundromats/dry cleaners, painting companies and paint storage, hide and fur companies, bulk oil storage, filling stations, various automotive service/repair facilities, printing businesses, and solvent storage tank areas. The railroad has also existed approximately two blocks south throughout the history of the subject property.

Dinneen Property – 1618 O'Neil Street

Based on a review of available historical data, the subject property has been developed and used almost entirely for residential purposes since as early as 1886. By 1972, the residential dwellings appear to have been demolished and the subject property was a cleared lot, potentially used for auto storage by the commercial businesses located to the south. The immediately adjacent and surrounding properties have been used historically for mixed purposes, including commercial and residential. Increased commercial business development began occurring by 1930. Commercial businesses located adjacent to or in near proximity of

the subject property include the Wortham Machinery Company, which is a known VRP site, gas stations, a convenience store and restaurant, business offices, auto repair and auto sales shops

Recognized Environmental Concerns

Real or perceived environmental impacts at this site, and surrounding sites include but are not limited to: 1) possible volatile organic compound (VOC) contamination associated with activities on former dry cleaner and painting properties; 2) possible VOC, polycyclic aromatic hydrocarbon (PAH), and heavy metals contamination resulting from service stations and former auto repair facilities; 3) possible VOC, PAH, and heavy metals contamination resulting from use of bulk oil facilities; and 4) VOC, PAH, and heavy metals contamination resulting from over 100 years of railroad property. In addition, a former manufactured gas plant with documented contamination is located three blocks north of the subject properties and an orphan chlorinated solvent plume is situated beneath downtown Cheyenne. Potential environmental concerns regarding these sites include direct contact threats from impacted soil, migration of contaminants from soil to groundwater, off-site migration of contaminated groundwater, and direct contact with contaminated sediments or surface water.

Phase 2 ESA activities will include sampling and analysis of soil and groundwater for possible contamination that poses an environmental concern to the subject properties. This contamination includes: 1) petroleum-related compounds documented on nearby LUST sites including, gasoline range organics (GRO), and diesel range organics (DRO); 2) possible volatile organic compound (VOC) contamination associated with activities on former dry cleaners and solvent storage sites; 3) possible VOC, PAH, and heavy metals contamination resulting from use of gasoline UST and activities associated with filling stations and auto repair facilities; and 4) VOC, PAH, and heavy metals contamination resulting from over 100 years of railroad use south of the subject properties. In addition, a former manufactured gas plant with documented contamination is located three blocks north of the subject property, and an orphan chlorinated solvent plume is situated beneath downtown Cheyenne.

Depending upon the results of the soil and groundwater assessment, a soil vapor assessment may be warranted. The soil vapor assessment would be used to assess possible vapor intrusion risks to buildings or underground utility corridors constructed during future property redevelopment.

Geology

This preliminary evaluation of the site geology is based on existing published regional information, and site-specific data collected from borings advanced in the project area

by others. Regional information[1] indicates that surficial unconsolidated deposits in the Cheyenne area consist primarily of Quaternary unconsolidated alluvium and terrace materials (varying amounts of gravel, sand, silt, and clay) deposited by eastward-flowing streams. Fill materials may also be encountered in the area of interest, as indicated on geologic logs for borings previously advanced at the site. Based on available well logs and regional maps, the unconsolidated deposits in the Cheyenne area may range in thickness from 200 to 300 feet thick.

Alternating episodes of deposition and erosion created the Cenozoic sedimentary geologic units composing the High Plains aquifer system located beneath Cheyenne. Alluvium was deposited from the erosion of the uplift to the west or in-place erosion of Tertiary geologic units composing the High Plains aquifer system. Terrace deposits are erosional remnants of alluvium that were deposited along former or current stream valleys. The Arikaree Sandstone, consisting of very fine to fine-grained sandstone with beds of siltstone and volcanic ash, comprise the uppermost bedrock unit below the study area.

Hydrogeology

Groundwater is a major source for domestic, municipal, and industrial water supplies in the Cheyenne area. In Laramie County, the primary aquifers are the unconsolidated Quaternary alluvial and terrace deposits, the Tertiary Ogallala and Arikaree Formations, and the Tertiary White River Group or Formation; these aquifers are part of the High Plains aquifer system. Hydraulic connection among the Quaternary unconsolidated-deposit, Ogallala, and Arikaree aquifers, and the White River aquifer/confining unit varies locally, but regionally they are in sufficient hydraulic connection to compose a regional aquifer system.

Recharge to the aquifer system occurs through direct infiltration of precipitation and snowmelt, as well as seepage from streams. Discharge from the aquifer system occurs by evapotranspiration, seepage into streams, and discharge to springs and wells.

Depth to groundwater below the study area ranges from approximately 5 to 15 feet below ground surface, depending upon the elevation of the ground surface. Regional groundwater flow in the High Plains Aquifer System is generally east; however, flow in the shallow aquifer may locally be variable based on the proximity to discharge areas (i.e., Crow Creek).

Site Conceptual Model

A site conceptual model was prepared in accordance with WDEQ Fact Sheet #8. The conceptual model is a preliminary evaluation and description of the natural

[1] Babcock, H. M., and Bjorklund, L. J., 1956, Ground-Water Geology of Parts of Laramie and Albany Counties, Geological Survey Water Supply Paper 1367, US Government Printing Office, Washington, 1956

environment that exists at the site, including hydrogeologic conditions, potential contamination sources, contaminant release mechanisms and migration routes, potential human and ecological receptors that may come in contact with contaminants, and potential exposure pathways. The conceptual model is based on existing published information or knowledge of a site and provides a preliminary framework for planning and implementing site characterization activities.

Based on existing information, we anticipate the site stratigraphy in the project corridor will consist of undifferentiated fill material overlying stratified layers of gravel, sand, silt and clay alluvial, and terrace deposits to the depth of exploration.

Depth to groundwater is anticipated to be less than 10 feet below ground surface. Recharge to the upper aquifer system is likely through direct infiltration of precipitation and snowmelt. Discharge from the shallow aquifer system likely occurs by evapotranspiration and seepage into Crow Creek. Groundwater flow in the shallow water table aquifer is expected to be southeast, as indicated in reports prepared by others.

Real or perceived environmental impacts at this site include but are not limited to: (1) contaminant concerns related to railway history such as leachate from pre-treated railroad ties (creosote and pentachlorophenol); coal storage for operations; and residue from a variety of freighted materials stored temporarily along the rail line; (2) oil and diesel spills, metals, and chlorinated solvent concerns in soil and groundwater from historic releases; (3) fill materials of unknown origin; and (4) solvents, oils, metals in soil and/or groundwater deposited via stormwater during frequent and heavy flooding events.

Likely contaminant release mechanisms and exposure routes include direct contact and ingestion of contaminated soil or surface water by on-site workers and trespassers. Infiltration of precipitation may also transport contaminants from soil into the groundwater; impacted groundwater could be discharging to Crow Creek.

4.0 Sampling Objectives and Rationale

Data Quality Objectives (DQOs) are qualitative and quantitative statements that clearly state the objective of a proposed project, define the most appropriate type of data to collect, determine the appropriate conditions for data collection, and specify acceptable decision error limits that establish the quantity and quality of data needed for decision making. The DQOs are based on the use of the data that will be generated. Different data uses may require different quantities of data and levels of quality. DQOs were developed in accordance with WDEQ Fact Sheet #28 and are further defined in the EPA approved Quality Assurance Project Plan (QAPP) prepared for sites characterized under the City of Cheyenne's Area-Wide Brownfield Assessment Grant.

The need to implement remedial action at the sites identified in this SAP, and the type of remedial action that may be required is contingent on the hydrogeologic conditions and other physical and environmental characteristics at the site. Therefore, a complete and accurate assessment of conditions at these sites is essential. The overall goal of this assessment is to provide information for redevelopment.

The following site characterization issues will be addressed across selected parcels to effectively evaluate the potential threat to human health and welfare or the environment:

- Define topography and major geomorphic features
- Define the local geology including the origin, texture, thickness, and distribution of the unconsolidated deposits
- Determine local hydrogeologic conditions including depth to groundwater, groundwater flow directions, and gradients
- Determine the type and distribution of contaminants of concern in soil and groundwater
- Evaluate potential contaminant pathways and the potential for migration in soil and groundwater

The primary objectives of the assessment are to:

- Characterize the hydrogeologic and other environmental conditions
- Determine the presence of potential environmental impacts at the sites
- Evaluate the threat, if any, to human health and the environment
- Evaluate the need to implement remedial action at the site in regards to site redevelopment
- Determine the concentrations and extent of environmental impacts from the former site operations
- Determine the potential presence of contaminants in soil and groundwater

- Evaluate the groundwater flow system to determine the potential for off-site migration
- Evaluate the groundwater chemistry to determine the potential fate and transport of the constituents of concern.

Assessment Tasks

Tasks to be performed to meet the objectives of the assessment include advancing soil borings and soil probes, installation of groundwater monitoring wells, performing in-situ hydraulic conductivity tests, collection and laboratory analysis of soil and groundwater samples, and evaluation of the data collected. The number of probes, borings, and wells included in the sampling and analysis plan for each of the sites are summarized in Table 1. The locations of the proposed borings and wells, shown on Figure 2 through Figure 4, are driven by the project-wide site-characterization issues and assessment objectives, as well as by the previous site Phase I findings. The exact location of these soil probes and borings are contingent on the location of underground utilities, site accessibility, and safety of field personnel. The rationale for the selection of sampling locations and the types of environmental samples to be collected is described below. Specific sample locations, depths, and analysis for the site are outlined in Table 1.

1620 Pioneer Avenue

Shallow Soil Samples

Six shallow soil probes will be advanced using a Geoprobe™ to a maximum depth of 10 feet below ground surface. The purpose of these shallow probes and borings is to evaluate the soils for the presence and concentration of contaminants in soil related to past commercial and industrial operations at the site, and nearby historical operations including gasoline stations, automotive repair shops, auto dealerships and junk yards. One additional soil boring will be advanced to an estimated depth of 30 feet for installation of a piezometer. Contaminants of potential concern include VOC, PAH, GRO/DRO, and RCRA metals.

Groundwater Samples

One round of groundwater samples will be collected from each of the three existing water table wells, and the one new piezometer installed on the parcel during this assessment. The samples will be collected in accordance with the procedures detailed in Section 8.0 and the project QAPP. The samples will be submitted to a laboratory and analyzed for VOC, PAH, GRO/DRO, and RCRA metals (total). Information obtained from the wells will be used to evaluate the groundwater flow system, and determine the concentration of contaminants in groundwater.

517 W. 17th Street

Shallow Soil Samples

Nine shallow soil probes will be advanced using a Geoprobe™ to a maximum depth of 10 feet below ground surface. Three additional shallow borings, and one deep soil boring will be advanced to an estimated depth of 20 feet and 30 feet, respectively, using hollow stem auger techniques. The borings will be used for construction of monitoring wells after soil samples are obtained.

The purpose of these shallow probes and borings is to evaluate the soils for the presence and concentration of contaminants in soil related to historical operations at the site including a livery, hotel, livestock feed sales and supply, auto storage, and a machinery company; and nearby historical operations including gasoline stations, automotive repair shops, auto dealerships, junk yards, iron works, and the railroad. Contaminants of potential concern include VOC, PAH, GRO/DRO, and RCRA metals.

Groundwater Samples

One round of groundwater samples will be collected from three water table wells and one piezometer to be installed on the parcel. The samples will be collected in accordance with the procedures detailed in Section 8.0 and the project QAPP. The samples will be submitted to a laboratory and analyzed for VOC, PAH, GRO/DRO, and RCRA (total) metals. Information obtained from the wells will be used to evaluate the groundwater flow system, and determine the concentration of contaminants in groundwater.

1618 O'Neil Avenue

Shallow Soil Samples

Seven shallow soil probes will be advanced using a Geoprobe™ to a maximum depth of 10 feet below ground surface. Four additional shallow borings, and one deep soil boring will be advanced to an estimated depth of 20 feet and 30 feet, respectively, using hollow stem auger techniques. The borings will be used for construction of monitoring wells after soil samples are obtained.

The purpose of these shallow probes and borings is to evaluate the soils for the presence and concentration of contaminants in soil related to historical operations near the site. The surrounding properties have been used historically for a variety of light industrial and commercial purposes. Some of the immediately adjacent property uses include bulk fuel oil storage facilities, railroad right of way, auto sales and service, and coal storage. Contaminants of potential concern include VOC, PAH, GRO/DRO, and RCRA metals.

Groundwater Samples

One round of groundwater samples will be collected from four water table wells and one piezometer to be installed on the parcel. The samples will be collected in accordance with the procedures detailed in Section 8.0 and the project QAPP. The

samples will be submitted to a laboratory and analyzed for VOC, PAH, GRO/DRO, and RCRA (total) metals. Information obtained from the wells will be used to evaluate the groundwater flow system, and determine the concentration of contaminants in groundwater.

Soil sampling and soil vapor screening methodologies are discussed in Section 8.0. All soil samples collected for subsequent lab analysis will be obtained from the unsaturated zone. The soil sample with the highest PID readings at each boring or sampling location will be selected for laboratory analysis. If no volatile organic contamination is identified above background using the field screening, a sample from each borehole or sampling location will be selected based on the following:

1. Obvious discoloration or other visible signs of contamination;

2. If no visible signs of contamination are evident, a sample from the top 4 feet will be selected for laboratory analysis to evaluate direct contact threat; or

3. A sample from a depth corresponding to the zone in the subsoil that is expected to contain the greatest concentration of contaminants will be selected for the laboratory analysis. This selection will be based on the type of release, the history of the area being investigated, and the geologic conditions at specific sample locations and will be determined in the field.

Table 1 Summary of Proposed Sample Locations and Analyses
17th Street Dinneen Properties
Phase II Assessment

Location	No. Probes/Borings & Wells /Depth	No. Samples / Analysis Performed	Sample Location Rationale
1620 Pioneer Ave. Dinneen Property	6 Soil Probes @ 10 feet (DP-GP1 thru DP-GP6) 1 Soil Boring @ 30 feet (DP-PZ-5) 3 Existing WT Wells @ 20 feet (MW-5, MW-6 and MW-15) 1 Piezometer @ 30 feet (DP-PZ-5) Note: Existing WT wells on this property are from previous assessment.	6 Soil – VOC 6 Soil – PAH, GRO, DRO, RCRA Metals 1 Soil – Protocol B 4 GW – VOC, GRO, DRO, PAH, RCRA Metals	• Determine type and distribution of unconsolidated deposits • Determine presence of contaminants in unsaturated soils related to historical site activities • Evaluate shallow and deep groundwater flow system and water quality
517 W. 17th Street Dinneen Property	6 Soil Probes @ 10 feet (DP-GP7 thru DP-GP12) 3 Soil Borings @ 20 feet (DP-MW-1 and DP-MW-3) 1 Soil Boring @ 30 feet (DP-PZ-4) 3 WT Wells @ 20 feet (DP-MW-1 thru DP-MW-3) 1 Piezometer @ 30 feet (DP-PZ-4)	9 Soil – VOC 5 Soil – PAH, GRO, DRO, RCRA Metals 4 GW – VOC, GRO, DRO, PAH, RCRA Metals	

Location	No. Probes/Borings & Wells /Depth	No. Samples / Analysis Performed	Sample Location Rationale
1618 O'Neil Ave. Dinneen Property	7 Soil Probes @ 10 feet (DP-GP13 thru DP-GP19) 4 Soil Borings @ 20 feet (DP-MW-4 and DP-MW-7) 1 Soil Boring @ 30 Feet (DP-PZ-4) 4 WT Wells @ 20 feet (DP-MW-4 and DP-MW-7) 1 Piezometer @ 30 feet (DP-PZ-4)	11 Soil – VOC 6 Soil – PAH, GRO, DRO, RCRA Metals 5 GW – VOC, GRO, DRO, PAH, RCRA Metals	

Note:

Designations for probes, borings, and wells installed during this assessment are prefaced with "DP" (Dinneen Properties) to distinguish sample locations from other borings and wells previously installed at the property.

Probes, borings and wells are numbered sequentially across the three Dinneen properties associated with this SAP. Existing monitoring wells on the 1620 pioneer Avenue property retain their original numbers for consistency with historical documents.

5.0 Schedule

A project schedule (Figure 5) was developed based upon the estimated duration of the various tasks described in this work plan. Actual start and completion dates, and milestones are contingent on regulatory review schedules, work plan negotiations, well installation and access permitting, and the actual scope of work performed. Significant changes in review times or the scope of work outlined in this work plan will necessarily affect the project schedule.

Ayres Associates will manage (shorten or lengthen) the project schedule based upon the client's or project needs. The schedule can be shortened if circumstances prevent critical project milestones from being achieved. If necessary, Ayres Associates will shorten the schedule, where possible, by overlapping project tasks, decreasing lag time between tasks, decreasing task duration, or allocating additional resources.

A revised schedule will be prepared and submitted upon approval of the SAP.

6.0 Project Team and Management

Organization

Ayres Associates has assembled a project team experienced in the various requirements of this project. The project organization, including key individuals of the project team, is indicated on the organization chart in Section 1 of the QAPP. Project management and field work will be directed and performed out of Ayres Associates' Madison, Wisconsin, office.

Project leadership and primary staff will be comprised of individuals experienced in the activities outlined in the scope of work. Our project team will provide experience in hydrogeologic analysis, geochemistry, risk assessment, environmental engineering, and remedial design.

7.0 Objectives of Sampling Program

The purpose of the sampling program is to characterize the nature and extent of contamination at the sites. This requires obtaining the necessary information regarding the type, distribution, and concentration of chemical contaminants present, as well as site-specific hydrogeologic and other environmental conditions that may affect potential contaminant migration. This information will be used to evaluate the potential health and environmental risks posed by the contaminants identified as they relate to site redevelopment. The information will also be used to evaluate remedial technologies and alternatives that are appropriate for site conditions, if required. To evaluate the potential threat to human health and the environment, the following overall site characterization issues will be addressed:

- Define the local geology including the origin, texture, thickness, and distribution of the unconsolidated deposits
- Determine the local hydrogeologic conditions including depth to groundwater, and groundwater flow directions and gradients
- Determine the type and distribution of contaminants of concern in the soil and groundwater
- Evaluate potential contaminant pathways and the potential for migration in soil and groundwater
- Determine type and distribution of unconsolidated deposits
- Evaluate groundwater quality

Rationale for Selection of Analytical Parameters

The emphasis of this sampling program is on evaluation of the overall site hydrogeologic characteristics and the concentration and distribution of contaminants of concern in the soil and groundwater. The proposed analytical program includes the collection and analysis of soil and groundwater samples.

Selection of the sampling parameters to be analyzed is based primarily on information regarding the type of activities historically performed at specific sites within the corridor, and on the results of soil and groundwater samples collected and analyzed during previous assessments by others. Existing analytical data collected in or near the project corridor indicate that soil and groundwater samples had previously been analyzed for volatile organic compounds (VOC), polynuclear aromatic hydrocarbons (PAH), gasoline range organics (GRO), diesel range organics (DRO), and heavy metals. Therefore, the sampling program for this site assessment will include all of the parameters discussed above.

The laboratory program for the assessment is discussed in detail in Section 10.0.

Analytical Data Quality Levels

Two analytical levels address the data uses and the QA/QC effort required to achieve the desired level of quality appropriate for this project. These levels are:

Screening (Level 1) – Analytical level 1 provides the lowest data quality but the most rapid results. This level involves the use of field instruments and is used for data collection activities that involve non-rigorous analysis and quality assurance. Portable instruments will be used for health and safety monitoring and preliminary site characterization. A photo-ionization detector (PID) will be used to qualitatively assess environmental media for the presence of potential VOCs. This information will be used to evaluate the need for confirmatory analysis and will provide information on the degree of potential impacts at the site. A PID will also be used to monitor ambient air conditions for health and safety. Additional field instrumentation will include a flow-through cell and multi-parameter water quality probe to measure pH, temperature, dissolved oxygen, conductivity, and oxidation-reduction potential in the aquifer.

Confirmation (Level 2) – Analytical level 2 involves analysis of sampling media in an off-site certified analytical laboratory. This level of analysis is used to meet data quality objectives that require a high degree of qualitative and quantitative accuracy using rigorous methods of analysis and quality assurance. Analytical level 2 uses standard, documented USEPA approved procedures for analysis, but does not use data validation or documentation procedures required for higher level DQO objectives.

Analytical level 2 analysis will be used to provide confirmed identification and quantification of organic and inorganic compounds in soil and groundwater samples collected at the site. These methods provide detection limits that are sufficiently low to provide data that can be used to support decisions regarding site characterization, risk assessment, and evaluation of remedial alternatives. Detection limits for parameters to be analyzed during this assessment are further discussed in Section 10 (Laboratory Program).

Results obtained from the analytical program will be compared to state and federal cleanup criteria or goals to support decisions regarding site characterization, risk assessment, and evaluation of remedial alternatives. Wyoming Department of Environmental Quality or EPA generic numerical standards may be the applicable standards for cleanup criteria, as outlined in WDEQ Fact Sheet #12. Soil and sediment concentrations will be compared to the applicable soil standards presented in WDEQs look-up tables which are based on EPA Regions 9 Regional Screening Levels (RSLs). These soil standards for direct contact and protection of groundwater are presented in Table 5 of this SAP.

The applicable cleanup standards for groundwater in Wyoming are a combination of promulgated values and risk-based cleanup levels (WDEQ Fact Sheet #13). The promulgated values include the EPA Safe Drinking Water Act Maximum Contaminant Level (MCL) concentrations and WDEQ Water Quality Chapter 8 standards. Risk-based standards may also be calculated using equations presented in Part J, Chapter 17, WDEQ Water Quality Rules and Regulations. Groundwater results will be

compared with WDEQ standards presented in Table 6. Soil gas/indoor air results will be compared with the EPAs Regional Screening Level (RSL) standards. If sample results collected as part of the property assessment are all below the applicable WDEQ and EPA standards, then the redevelopment project will proceed as planned.

If sample results exceed the applicable Wyoming environmental standards, the City of Cheyenne will consider the following options:

If contaminant levels exceed the WDEQ criteria, then the City of Cheyenne may opt to resample the specific locations associated with elevated contaminant levels. If any of the resample results confirm the original data, the City will consider the second option listed below. If all the resample results are below WDEQ criteria, no further remedial action will be pursued at the property.

If soil or groundwater contaminant levels exceeding WDEQ standards are associated only with a specific exposure pathway, the City of Cheyenne may then conduct a property-specific risk assessment and pursue an exclusion of exposure pathways through the use of engineering and institutional controls. These controls may be implemented through an Operation and Maintenance (O&M) Agreement with the WDEQ.

If an exposure pathway cannot be eliminated through engineering or institutional controls, then the City of Cheyenne may develop a Remedial Action Plan (RAP) to meet the needs of the proposed future use of the property.

If remediation is not cost effective for a particular site and property use, the City of Cheyenne may elect to modify plans for future use of the property.

If soil and groundwater standards have not been promulgated for specific contaminants by the State of Wyoming, Ayres Associates will evaluate federal standards for applicability. Soil metal concentrations may also be subjected to comparison with other guidance values, such as site “background” concentrations.

8.0 Scope of Work

Phase I Field Assessment Objectives

The scope of work detailed in this SAP is designed to meet the objectives of the assessment outlined in Section 7.0. The emphasis of this phase of assessment will be on evaluation of site hydrogeologic characteristics, and soil and groundwater quality, to determine the actual or potential threat to human health and the environment.

The assessment will be conducted in phases. The first phase of assessment will include advancing soil borings, installation of water table observation wells and piezometers, and laboratory analysis of soil and groundwater samples. Data obtained through installation and sampling of the monitoring wells will be used to evaluate geologic characteristics of the site, determine vertical and horizontal groundwater flow directions, gradients, and velocity; and evaluate soil and water quality at the site. These data will be used to evaluate remedial options and engineering controls that may be required for redevelopment. The scope of work for subsequent phases of assessment, if any, is contingent on the first phase of assessment, and therefore, cannot be determined at this time.

Field Assessment Activities

Assessment Strategy

Ayres Associates evaluated each of the properties of interest for known or potential environmental impacts. An assessment strategy was developed, and sample locations selected for each of the properties based on this preliminary evaluation. Sample locations and the analytical program are summarized in Table 1 (Section 4). Site specific conditions, as well as overall project objectives, were considered in formulating our project approach. The overall goal of this assessment is to provide information for redevelopment of these sites. This will be done by supplementing the information previously gathered for these and adjacent sites to determine if and how these properties have been affected by prior or nearby site activities. Field assessment tasks common to one or more project sites are detailed below.

Permitting

Permit and land access agreements will not be required to install and sample borings or monitoring wells on City-owned property for this phase of assessment. Permit and land access agreements may be required to install and sample monitoring wells on private property. Ayres Associates will work with the City of Cheyenne to obtain the required permits and resolve site access issues, as necessary.

Soil Assessment

Drilling and Soil Sampling Methods

Borings advanced for the installation of monitoring wells will be drilled using hollow stem auger techniques. The augers will have a minimum inside diameter of 4¼-inches. Shallow borings advanced to exclusively evaluate soil quality will be performed using Geoprobe™ System hydraulic push techniques.

Continuous samples will be collected from the ground surface to the depth of exploration when advancing the borings or probes. Conventional split-spoon-sampling techniques will be used for borings advanced using hollow stem auger and probes in accordance with standard operating procedure SOP #120 [Appendix D – Quality Assurance Project Plan (QAPP)]. Geologic information obtained from the boreholes will be documented on WDNR Soil Boring Log Information Form 4400-122 (Appendix E - QAPP).

Samples of the unconsolidated material will be collected for detailed lithologic description, field screening, and laboratory analysis. Soil (and groundwater) sampling equipment will be decontaminated before use in accordance with SOP #510 (Appendix D – QAPP).

Soil samples obtained from the borings and probes using split-spoon sampling techniques will be screened for the presence of total ionizable VOCs. Field screening will be performed using a PID in accordance with standard operating procedure SOP #210 (Appendix D- QAPP). Samples will be selected for possible laboratory analysis based on visual and olfactory observations and PID screening results. If PID field screening results exceed five instrument units (above background), a co-located sample will be collected immediately from a fresh surface of the soil sample for possible laboratory analysis. Soil samples will be collected and preserved using the procedures outlined for soil vapor screening and methanol preservation of soil samples (VOC analysis) SOP #210 and SOP #220, respectively.

Surface or near-surface soil samples will be used primarily to assess the direct-contact exposure pathway and the potential limitations to site re-use based on human health issues. Subsurface soil sample data will be used primarily to assess the potential for site impacts to affect the groundwater pathway, and to evaluate the individual sites as potential sources for the groundwater contamination.

Borehole Abandonment

Each borehole advanced during this assessment, and not converted into a monitoring well, will be properly abandoned. All boreholes requiring abandonment will be abandoned in accordance with WDEQ Water Quality Division, Chapter 11. Bentonite chips no greater than 3/8-inch diameter will be used to seal all boreholes. Borehole abandonment will be properly documented using a WDEQ Well/Borehole Abandonment Form.

Groundwater Assessment

Water Table Observation Well Installation

Water table observation wells will be installed in borings advanced below the water table. The water table wells will be installed at a depth of approximately 15 to 20 feet below ground surface, depending on the depth to groundwater. The purpose of the water table observations wells is to evaluate groundwater flow and potential contaminant transport at the water table. Water table observation wells will be constructed of 2-inch inside diameter (ID) schedule 40 PVC riser and screen. Water table observation wells will be constructed with a 10-foot length of 0.006-inch to 0.010-inch slot PVC screen, depending on the grain size of the sediments encountered. Monitoring wells will be installed in accordance with standard operating procedure SOP #110 (Appendix D – QAPP), as well as WDEQ, Water Quality Division, Chapter 11.

Monitoring well casing and screen will be inserted in the boreholes after the target depth is reached. A sand filter pack (#45-#55) will be installed around the well screen and will extend approximately 2-feet above the top of screen. A filter pack seal will be placed above the sand filter pack. The seal will consist of 2-feet of fine-grained sand placed above the gravel pack. Granular or chipped bentonite will be placed above the seal to a depth of approximately 4 inches below the ground surface. The remaining annular space will be filled with native soil. Protective steel casings with locking caps will be installed over each monitoring well. Water table well construction details will be documented on WDNR Monitoring Well Construction Form 4400-113A (Appendix E – QAPP) or WDEQ well construction form.

Piezometer Installation

Piezometers will be installed at depth within the unconfined, unconsolidated aquifer. The purpose of the piezometers is to evaluate water quality and groundwater flow conditions at depth within the aquifer. Piezometers will be located adjacent to existing water table observation wells to create well nests. Data obtained from the well nests will be used evaluate vertical groundwater gradients and the extent of vertical migration of potential constituents of interest. Water quality data obtained from the well nests will be used to evaluate the vertical extent of groundwater impacts.

Piezometers will be constructed of 2-inch inside diameter (ID) schedule 40 PVC casing and screen. The piezometers will be constructed with a 5-foot length of 0.006-inch to 0.01-inch slot schedule 40 PVC screen, depending on the grain size of the sediment encountered. Monitoring well casing and screen will be inserted in the borehole after the target depth is reached. A #45-#55 sand filter pack will be installed around the well screen and will extend approximately 2-feet above the top of screen. A filter pack seal will be placed above the filter pack. The seal will consist of 2-feet of fine-grained sand placed above the filter pack. Bentonite pellets or bentonite chips will be used for the bentonite seal above the fine-grained sand. Bentonite chips will be placed above the filter pack seal to a depth of approximately 4-inches below the ground surface. The remaining annular space will be filled with native soil. Protective steel casings with locking caps will be installed over each monitoring well. Piezometer

construction details will be documented on WDNR Monitoring Well Construction Form 4400-113A (Appendix E - QAPP) or WDEQ well construction form. A summary of proposed monitoring wells is shown in Table 2.

Well Development

Monitoring wells will be developed after construction to remove fine-grained materials from within the well screen and filter pack. The wells will be developed in accordance with SOP #130. The wells will be developed by over pumping with a purge pump until purge water remains clear. Logs of all well development procedures will be maintained. Purge water will be drummed or permission will be obtained to discharge the water directly to the sanitary sewer. Well development procedures will be documented on WDNR Monitoring Well Development Form 4400-113B (Appendix E – QAPP)

Monitoring Well Survey

Monitoring wells will be surveyed to determine their elevations and horizontal locations. At each monitoring well, the elevations of the top of the well casing will be surveyed to the nearest 0.01-foot. Ground surface elevation will be surveyed to the nearest 0.1-foot.

Hydraulic Conductivity Testing

In-situ hydraulic conductivity tests (slug tests) will be performed on each new water table well and piezometer installed. Slug tests will be performed by rapidly lowering a solid PVC cylinder into the well to cause an instantaneous rise in water level (falling head test) within the well, and then measuring the return of the water level to static conditions. A second test will be performed by measuring the water level response when the cylinder (rising head test) is removed. Water level measurements will be collected with a data logger and pressure transducer. The hydraulic conductivity data will be analyzed using Aqtesolve Pro™ v. 4.5 and Waterloo Hydrologic Aquifer Test v.3 graphical analysis and reporting software. Hydraulic conductivity data will be evaluated using the methods of Bouwer and Rice (1976) for unconfined aquifers.

Falling head tests (slug in) will be performed on both water table observation wells and piezometers to evaluate the relative response of the aquifer prior to performing a rising head test (slug out). This will be done to ensure the data logger is properly programmed, and the equipment is functioning properly. The results of the tests are also useful for comparing the relative values to ensure consistency in testing and analysis. However, falling head tests performed in water table observation wells will not be used to calculate the average hydraulic conductivity of the aquifer. The procedure for performing slug tests is detailed in SOP #410.

Collection and Analysis of Soil and Groundwater Samples

Soil Samples

Soil samples will be collected for laboratory analysis from each boring advanced during this assessment. The soil analytical program for each site will include some or all of the following (see Table 1), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOC), gasoline range organics (GRO), diesel range organics (DRO), Resource Conservation and Recovery Act (RCRA) metals, polychlorinated biphenyls (PCB), and polycyclic aromatic hydrocarbons (PAH). Soil sample analysis is further discussed in the Laboratory Program (Section 10).

Samples will be selected for analysis based on visual and olfactory observation, PID field screening results, conditions of the subsurface geology, and results of previous assessments performed at the sites. The physical/chemical properties of the analytes will also be considered in selecting soil samples for analysis. Decisions on the type and number of analyses to be performed will be made by the field scientist and the project hydrogeologist. Soil samples collected for analysis of non-volatile parameters will be obtained with a stainless trowel. A representative portion of the sample will be collected from the split-spoon and placed directly in the appropriate glassware (SOP #130). Soil samples collected for volatile analysis will be collected and preserved with methanol in accordance with SOP #220.

Groundwater Samples

To effectively evaluate the need for, and or type of, remediation required at the site, a complete and accurate assessment of groundwater quality is required. Data on contaminant types, concentrations, and distribution will be evaluated in conjunction with the physical/chemical properties of the constituents to determine their persistence and mobility within the subsurface.

Monitoring wells, consisting of a 2-inch diameter length of sand-packed PVC screen and riser, will be installed in probes advanced below the water table. A 0.25-inch diameter polyethylene tube will be inserted into the well and attached to a peristaltic pump. The well will be pumped until discharge water runs clear, after which time groundwater samples will be collected.

One round of groundwater samples will be collected from each of the new monitoring wells installed in the project area. Groundwater samples will be collected using the procedures detailed in SOP #310 and SOP # 320. Samples obtained for VOC analysis will be collected according to procedures detailed in SOP #350.

Prior to sample collection, water levels will be obtained from each of the monitoring wells. Groundwater samples will be collected from the water table wells and piezometers using peristaltic pump (where depth to water is less than 20 feet) or a Proactive SS-Mega Typhoon submersible pump, and low-flow pumping techniques. Each monitoring well will be equipped with dedicated tubing. The pump or peristaltic tubing will be inserted into the well so the pump intake is coincident with the middle of the well screen. Care will be taken to minimize disturbance of the water column and

sediments that may be present at the bottom of the well. The pump discharge line will be connected to the flow-through cell for monitoring water quality indicator parameters. The controller will be adjusted to an initial pumping rate of 1-liter/minute (L/min) until the line and pump are purged. The pumping rate will then be decreased to approximately 0.1 L/min. to 0.5 L/min., depending on the permeability of the geologic formation. The well will be purged until water quality parameters (pH, temperature, specific conductance, turbidity) stabilize for three consecutive measurements taken 5 minutes apart. Stabilization is defined when readings are within 10 percent of the previous reading and turbidity is less than or equal to 20 NTUs per WDEQ memorandum dated February 23, 2009. Water levels will also be checked to document drawdown from pumping. Water quality indicator parameters will be recorded on the standard sampling log (Appendix E – QAPP). Samples will be collected in pre-cleaned containers provided by the laboratory. Groundwater sampling information will be documented on standard Ayres Associates groundwater monitoring field-sampling forms (Appendix E).

The groundwater analytical program is detailed in Section 10 of this field sampling plan. Laboratory analysis for samples collected from the new well installed during this phase of assessment will include some or all of the following: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOC), Resource Conservation and Recovery Act (RCRA) metals, and polycyclic aromatic hydrocarbons (PAH).

Real time data on temperature, pH, specific conductance, dissolved oxygen, and oxidation-reduction (Redox) potential will be collected to compliment the analytical data collected from the monitoring wells. These data will be used to construct a "geochemical model" of conditions at the site to assist in the interpretation and understanding of attenuation and or transformation processes that may be occurring in the aquifer, and the potential fate of the constituents of interest.

Temperature, pH, specific conductance, turbidity, dissolved oxygen, and redox potential will be obtained using an In-Situ®, Inc. Troll 9000 multi parameter water quality monitoring system, or equivalent. Simultaneous temperature, pH, specific conductance, turbidity, dissolved oxygen, and redox readings will be taken continuously during pumping until readings have stabilized. Stabilized readings will be recorded on the field sampling form. Water quality field parameters will be collected in accordance with SOP #330.

Data Analysis and Evaluation

Data obtained through the background data review and environmental assessment will be analyzed and interpreted by Ayres Associates. The objectives of the analysis will be to determine the presence and significance of regulated chemical impacts to soil and groundwater related to historical activities at the site. The analytical data will be evaluated for temporal and spatial trends and compatibility with observations made in the field.

Results obtained from the analytical program will be compared to state and federal cleanup criteria or goals to support decisions regarding site characterization, risk

assessment, and evaluation of remedial alternatives. Soil and sediment concentrations will be compared to the applicable soil standards presented in WDEQs look-up tables (Fact Sheet #12) which are based on EPA Regions 9 Regional Screening Levels (RSLs). These soil standards for direct contact and protection of groundwater are presented in Table 5, Section 10 of this SAP.

The applicable cleanup standards for groundwater in Wyoming are a combination of promulgated values and risk-based cleanup levels (Fact Sheet #13). The promulgated values include the EPA Safe Drinking Water Act Maximum Contaminant Level (MCL) concentrations and WDEQ Water Quality Chapter 8 standards. Risk-based standards may also be calculated using equations presented in Part J, Chapter 17, WDEQ Water Quality Rules and Regulations. Groundwater results will be compared with WDEQ standards presented in Table 6. Soil gas/indoor air results will be compared with the EPAs Regional Screening Level (RSL) standards.

Note that state and federal soil and groundwater standards are periodically updated; results obtained from the assessment will be compared to the most recent standards available.

Site Assessment Report

A draft report summarizing findings of the site will be submitted to the City of Cheyenne for review and comment. The report will include a description of site conditions, subsurface geology, results and interpretation of the laboratory analytical data. A final report will be prepared following the City's review of the draft report. Reporting activities will include completion and submission of required reports and forms to all applicable state and local agencies. Monthly project memoranda will also be prepared to keep the City's project team and regulatory agencies apprised of project activities.

Remedial Action Options Report

A remedial action options report will be prepared in accordance with Article 35-11-1601 Wyoming Statutes. The purpose of the remedial action options evaluation is to identify remedial alternatives for the site(s) that will effectively mitigate risk associated with contaminants of concern at the each site, and that are protective of human health and the environment during and after implementation of remediation. Key elements in performing this evaluation include: identification and screening of potential alternatives, detailed evaluation of reasonable alternatives identified during the screening phase, and selection of one or more remedial options for implementation. Evaluation of the alternatives will be performed using the evaluation criteria presented in Article 35-11-1601 Wyoming Statutes.

Community Involvement

Ayres Associates will support the City of Cheyenne in implementing a community relations program in association with assessment in accordance with WDEQ Fact Sheet #2. The community relations program will consist of activities conducted throughout the planning and implementation phases of the project to encourage

communication between all stake holders including federal, state and local officials, potential developers, and the public. The overall objective of community relations are to:

- Inform the public of planned or on-going activities
- Provide the public the opportunity to express comments on and provide input to technical and planning decisions
- Identify and resolve conflict

Ayres Associates will work with independent economic groups, developers, representatives of WDEQ, and attorneys who join us in public informational meetings to provide additional levels of expertise to the community members. Open communication is the key to successful project planning and timely and efficient project completion.

Table 2 Summary of Proposed Monitoring Wells

City of Cheyenne: West Edge

Site Location	Well Name[1]	Type of Well[2]	Estimated Depth[3]
1620 Pioneer Avenue[4]	DP-MW-5	W.T. Observation	20 Feet
	DP-MW-6	W.T. Observation	20 Feet
	DP-MW-15	W.T. Observation	20 Feet
	DP-PZ-5	Piezometer	30 feet
517 W. 17th Street	DP-MW-1	W.T. Observation	20 Feet
	DP-MW-2	W.T. Observation	20 Feet
	DP-MW-3	W.T. Observation	20 Feet
	DP-PZ-2	Piezometer	
1618 O'Neil Avenue	DP-MW-4	W.T. Observation	20 Feet
	DP-MW-5	W.T. Observation	20 Feet
	DP-MW-6	W.T. Observation	20 Feet
	DP-MW-7	W.T. Observation	20 Feet
	DP-PZ-4	Piezometer	30 Feet

[1] Designations for wells installed during this assessment are prefaced with "DP" (Dinneen Properties) to distinguish them from wells installed during previous assessments.
[2] Monitoring wells designated as water table (W.T.) observation wells.
[3] Estimated well depth is depth below ground surface.
[4] Water table observation wells at 1620 Pioneer Avenue are present from previous assessment.

9.0 Storage and Disposal of Assessment Wastes

The drilling and sampling activities performed during this assessment are expected to generate solid and liquid "waste." The anticipated waste types and management procedures for each activity are summarized below:

- Drilling/ Monitoring Well Installation – Solid wastes consisting of waste paper, plastic, well casing, protective clothing, and drill cuttings may be generated during drilling and well installation activities. All solid wastes exclusive of the drill cuttings will be bagged and disposed as solid wastes in a Subtitle D municipal landfill.

  Soil cuttings generated during drilling and sampling procedures will be contained in 55-gallon DOT drums and left on-site for subsequent disposal.

- Well Development/Groundwater Sampling – Solid wastes generated during well development and groundwater sampling activities may include tubing and filters, bailer rope, plastic and paper, and disposable protective clothing. All solid wastes generated during these field activities will be bagged and disposed as solid wastes in a Subtitle D municipal landfill.

Liquid waste generated during these activities will include well development water and purge water. Water obtained from existing wells that previously did not contain contamination will be discharged to the ground surface near the well location. Water obtained from new wells installed during this assessment, and water obtained from wells that are known to be contaminated, will be collected in 55-gallon DOT drums. Permission will be obtained from the City to discharge this water to the sanitary sewer at the point of generation if acceptable to the publicly-owned treatment works. The decision to discharge the water to the sanitary sewer will be based on the type and concentration of contaminants. If permission cannot be obtained to discharge the water to the sanitary sewer, the water will be retained for subsequent off-site disposal.

All 55-gallon drums containing solid or liquid wastes will be stored in a single secured location on City-owned property within the project corridor. Solids and liquids will be contained in separate drums. Each drum will be secured and properly labeled as to location, waste type, date, and other pertinent information.

10.0 Laboratory Program

The proposed analytical program for the assessment includes collection of soil and groundwater samples. Table 3 summarizes the proposed analytical program for the six sites. This table provides the field and laboratory parameters, the number of sampling points and sampling rounds, and the total number of investigative samples, field duplicates, field blanks, and trip blanks to be collected for each sample matrix. Field blanks for soil samples will be equipment rinse blanks collected in accordance with SOP #360 (Appendix D – QAPP).

Table 4 summarizes the appropriate laboratory glassware, preservatives, and holding times for each sample matrix. Analytical parameters, laboratory methods, and detection limits for soil and groundwater samples are summarized in Table 5, Table 6, and Table 7, respectively. Note that state and federal soil and groundwater standards are periodically updated; results obtained from the assessment will be compared to the most recent standards available.

Table 3 Cheyenne: West Edge - Phase II Assessment

Analytical Program – CT Laboratories

				Investigative Samples			Quality Control Samples				
Site Location	**Sample Matrix**	**Field Parameters**	**Laboratory Parameters**	**Sample Points**	**Sampling Rounds**	**Total Samples[1]**	**Field Duplicates**	**Field Blanks**	**Trip Blanks[3]**	**MS/ MSD[4]**	**Matrix Total**
1620 Pioneer Avenue	Soil		VOC[2]	6	1	6	0	0	2	0	8
			GRO/DRO	6	1	6	0	0	0	0	6
			PAH	6	1	6	1	0	0	1	8
			RCRA Metals	6	1	6	1	0	0	0	7
			Protocol B	1	1	1	0	0	0	0	1
	Ground water	pH, Temp, Diss. Oxygen Turbidity Redox Potential Conductivity	VOCs	4	1	4	0	0	1	0	5
			GRO/DRO	4	1	4	0	0	0	0	4
			PAH	4	1	4	0	1	0	0	5
			Metals (Total)	4	1	4	1	0	0	0	5
517 W. 17th Street	Soil		VOC[2]	9	1	9	0	0	1	1	11
			GRO/DRO	5	1	5	0	0	0	0	5
			PAH	5	1	5	0	1	0	0	6
			RCRA Metals	5	1	5	1	0	0	0	6
	Ground water	pH, Temp, Diss. Oxygen Turbidity Redox Potential Conductivity	VOC	4	1	4	0	1	1	0	6
			GRO/DRO	4	1	4	0	0	0	0	4
			PAH	4	1	4	1	0	0	0	5
			Metals (Total)	4	1	4	0	0	0	1	5

				Investigative Samples			Quality Control Samples				
Site Location	**Sample Matrix**	**Field Parameters**	**Lab Parameters**	**Sample Points**	**Sample Rounds**	**Total Samples[1]**	**Field Duplicates**	**Field Blanks**	**Trip Blanks[3]**	**MS/ MSD[4]**	**Matrix Total**
1618 O'Neil Avenue	Soil		VOC[2]	11	1	11	0	0	1	0	12
			GRO/DRO	6	1	6	0	0	0	0	6
			PAH	6	1	6	0	0	0	1	7
			RCRA Metals	6	1	6	1	0	0	0	7
	Ground water	pH, Temp, Diss. Oxygen Turbidity Redox Potential Conductivity	VOC	5	1	5	0	0	1	0	6
			GRO/DRO	5	1	5	0	0	0	0	5
			PAH	5	1	5	1	0	0	0	6
			Metals (Total)	5	1	5	0	0	0	1	6

Notes:

[1]Total number of investigative samples includes only one round of soil and groundwater sampling.

[2]One methanol blank per day will be submitted for analysis when soil samples are collected for VOC analysis.

[3]One trip blank will be submitted for each cooler that contains samples for VOC analysis.

[4]Samples designated for MS/MSD analysis will be collected with extra volumes at a frequency of one per group of 20 or fewer investigative samples. Double the normal sample volumes will be collected for MS/MSD samples.

Table 4 Sample Bottles, Preservatives, and Holding Times

CT Laboratories

Matrix	Analytes	Bottles	Preservatives	Holding Time
Soil	VOC	1 x 60 mL tared glass jar	MeOH, Cool to 4° C	14 days
	GRO	1 x 4 oz. amber glass jar	Zero headspace, Cool to 4° C	14 days
	DRO	1 x 4 oz. amber glass jar	Cool to 4° C	14/40 days (extraction/analysis)
	PAH	1 x 4 oz. amber glass jar	Cool to 4° C	14/40 days (extraction/analysis)
	Metals	1 x 4 oz plastic cup	Cool to 4° C	6 Months, Hg – 28 days Cr+6 – 28 days/24h extraction/analysis)
	Percent solids	1 x 4 oz. plastic cup	Unpreserved	7 days
Groundwater	VOC	3 x 40 mL glass vials	1:1 HCL to pH<2, cool 4° C	14 Days
	GRO	3 x 40 mL glass vials	1:1 HCL to pH<2, cool 4° C	14 days
	DRO	1 x 1liter amber glass jar	Cool to 4° C	7/40 days (extraction/analysis)
	PAH	1 x 1liter amber glass jar	Cool to 4° C	7/40 days (extraction/analysis)
	Metals (Total)	1 x 250 mL polyethylene	HNO_3 to pH<2, cool 4° C	6 months, Hg – 28 days

Note: Groundwater samples for metals analysis will <u>not</u> be field filtered in accordance with WDEQ February 2009 memorandum unless Turbidity exceeds 20 NTUs.

Table 5
Compound List, Quantitation Limits, and Standards
CT Laboratories
ICP Metals (mg/Kg)
Soil

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
				Resident Soil	Migration to GW		
Aluminum	6010C	0.28	0.92	77000	55000	58-141	36
Antimony	6010C	0.18	0.61	31	0.66	22-111	33
Arsenic	7010	0.13	0.44	0.39	0.0013	80-120	20
Barium	6010C	0.03	0.11	15000	300	66-122	26
Beryllium	6010C	0.01	0.034	160	58	55-124	31
Cadmium	6010C	0.011	0.036	70	1.4	53-118	28
Calcium	6010C	0.6	2.1	ns	ns	57-126	20
Chromium Hexavalent	7196A	2.6	8.6	39	2.1	24-143	30
Chromium Trivalent	6010C	2.6	8.6	120000	99000000	N/A	N/A
Chromium	6010C	0.11	0.36	280	ns	53-130	36
Cobalt	6010C	0.11	0.38	23	0.49	48-125	35
Copper	6010C	0.5	1.7	3100	51	41-139	29
Iron	6010C	1.4	4.6	55000	640	34-153	52
Lead	6010C	0.12	0.4	400	ns	45-135	37
Magnesium	6010C	0.7	2.3	ns	ns	61-128	23
Manganese	6010C	0.06	0.19	1800	57	27-162	42
Nickel	6010C	0.4	1.5	1600	48	46-126	32
Potassium	6010C	31	104	ns	ns	51-137	35
Selenium	6010C	0.29	0.98	390	0.95	64-113	29
Silver	6010C	0.17	0.57	390	1.6	61-116	29
Sodium	6010C	20	66	ns	ns	67-124	25
Thallium	6010C	0.3	1.1	5.1	0.17	44-127	32
Vanadium	6010C	0.13	0.45	390	180	58-122	37
Zinc	6010C	0.24	0.79	23000	680	46-123	28

Table 5 (continued)
Compound List, Quantitation Limits and Standards
CT Laboratories

Mercury (mg/Kg)
Soil

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
				Resident Soil	Migration to GW		
Mercury	7470	7471A	0.0009	6.7	0.033	ns	51-133

Cyanide (mg/Kg)
Soil

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
				Resident Soil	Migration to GW		
Cyanide	9012A	0.14	0.46	1600	7.4	22-158	49

ns	No standard established
mg/Kg	Standards reported as milligrams per kilogram, equivalent to parts per million (ppm)
Reporting Limit	Lowest level that can be reliably achieved within specified limits of precision and accuracy (not statistically derived).
Limit of Quantitation	Lowest quantity of a substance that can be distinguished from the absence of that substance (blank value) within a 99% probability (statistical calculation).

Table 5 (continued)
Compound List, Quantitation Limits and Standards
CT Laboratories
PAH 8310 (mg/Kg)
Soil

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)			
			Resident Soil	Migration to GW	MS/MSD %R	MS/MSD %RPD
1-Methylnaphthalene	0.011	0.038	16	0.0051	35-124	47
2-Methylnaphthalene	0.013	0.042	310	0.9	36-127	48
Acenaphthene	0.023	0.076	3400	27	24-136	51
Acenaphthylene	0.012	0.039	ns	ns	37-127	43
Anthracene	0.006	0.021	17000	450	42-119	47
Benzo(a)anthracene	0.0003	0.0010	0.150	0.014	29-134	54
Benzo(a)pyrene	0.0009	0.0030	0.015	0.0046	28-132	50
Benzo(b)fluoranthene	0.0023	0.0078	0.15	0.047	20-138	49
Benzo(g,h,i)perylene	0.004	0.012	ns	ns	16-139	46
Benzo(k)fluoranthene	0.0010	0.0033	1.5	0.46	25-129	50
Chrysene	0.0026	0.0086	15	1.4	38-130	51
Dibenzo(a,h)anthracene	0.005	0.018	0.015	0.015	40-119	43
Fluoranthene	0.0014	0.0046	2300	210	26-133	51
Fluorene	0.008	0.026	2300	33	45-114	47
Indeno(1,2,3-cd)pyrene	0.005	0.017	0.15	0.16	29-125	49
Naphthalene	0.011	0.035	3.9	0.00055	44-132	45
Phenanthrene	0.004	0.012	ns	ns	37-132	49
Pyrene	0.0021	0.0071	1700	150	31-127	52

ns No standard established
mg/Kg Standards reported as milligrams per kilogram, equivalent to parts per million (ppm)

Table 5 (continued)
Compound List, Quantitation Limits and Standards
CT Laboratories
Petroleum 8015C (mg/Kg)
Soil

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)			
			Resident Soil	Migration to GW	MS/MSD %R	MS/MSD %RPD
Gasoline Range Organics (GRO)	1.3	4.2	28	b	48-134	11
Diesel Range Organics (DRO)	18	59	2300	b	23-133	44

ns No standard established
mg/Kg Standards reported as milligrams per kilogram, equivalent to parts per million (ppm)
b variable depending on depth to water

Table 5 (continued)
Compound List, Quantitation Limits and Standards
CT Laboratories
VOC 8260 (mg/Kg)
Soil

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
			Resident Soil	Migration to GW		
1,1,1,2-Tetrachloroethane	0.011	0.037	2.0	0.00021	74-112	13
1,1,1-Trichloroethane	0.016	0.052	9000	3.3	76-118	13
1,1,2,2-Tetrachloroethane	0.013	0.043	0.59	0.000028	67-120	18
1,1,2-Trichloroethane	0.015	0.050	1.1	0.000082	72-124	20
1,1-Dichloroethane	0.014	0.047	3.4	0.0007	75-122	21
1,1-Dichloroethene	0.013	0.042	250	0.12	66-135	19
1,1-Dichloropropene	0.022	0.073	ns	ns	78-116	16
1,2,3-Trichlorobenzene	0.014	0.045	49	0.015	63-136	47
1,2,3-Trichloropropane	0.015	0.050	0.091	0.0000044	66-130	20
1,2,4-Trichlorobenzene	0.015	0.050	87	0.013	68-127	35
1,2,4-Trimethylbenzene	0.014	0.045	67	0.024	73-123	13
1,2-Dibromo-3-chloropropane	0.021	0.070	0.0056	1.5E-7	57-120	29
1,2-Dibromoethane	0.012	0.041	0.034	0.0000019	81-110	14
1,2-Dichlorobenzene	0.015	0.049	2000	0.4	81-114	11
1,2-Dichloroethane	0.013	0.042	0.45	0.000044	73-121	16
1,2-Dichloropropane	0.015	0.050	0.93	0.00013	77-118	15
1,3,5-Trimethylbenzene	0.013	0.043	47	0.02	76-120	13
1,3-Dichlorobenzene	0.012	0.041	ns	ns	83-111	13
1,3-Dichloropropane	0.014	0.045	1600	0.27	81-115	15
1,4-Dichlorobenzene	0.012	0.040	2.6	0.00046	82-110	12
2,2-Dichloropropane	0.015	0.050	ns	ns	63-117	17
2-Butanone	0.14	0.47	28000	1.5	70-126	24
2-Chlorotoluene	0.010	0.034	1600	0.8	74-119	15
2-Hexanone	0.13	0.45	210	0.0079	64-136	25
4-Chlorotoluene	0.011	0.035	5500	2.8	72-124	14
4-Methyl-2-pentanone	0.14	0.45	5300	0.44	67-135	21
Acetone	0.12	0.40	61000	4.4	54-143	28
Benzene	0.004	0.013	1.1	0.00023	80-124	24
Bromobenzene	0.010	0.032	94	0.015	81-112	14
Bromodichloromethane	0.015	0.050	10	0.0003	77-114	15
Bromoform	0.017	0.055	61	0.0023	56-117	19
Bromomethane	0.030	0.100	7.9	0.0022	52-151	30
Carbon Disulfide	0.021	0.071	670	0.27	58-137	22
Carbon tetrachloride	0.019	0.062	0.25	0.000079	72-117	13
Chlorobenzene	0.014	0.047	310	0.068	81-112	11
Chlorodibromomethane	0.011	0.036	5.8	0.00022	69-109	14
Chloroethane	0.019	0.062	15000	6.0	48-156	34
Chloroform	0.011	0.038	0.3	0.000055	77-117	13

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
Chloromethane	0.015	0.051	1.7	0.00046	61-137	19
cis-1,2-Dichloroethene	0.014	0.046	780	0.11	79-116	13
cis-1,3-Dichloropropene	0.011	0.036	ns	ns	76-114	15
Dichlorodifluoromethane	0.022	0.073	190	0.61	55-145	16
Diisopropyl ether	0.013	0.042	2400	0.37	73-124	16
Ethylbenzene	0.012	0.039	5.7	0.0019	79-124	24
Hexachlorobutadiene	0.016	0.052	6.2	0.0019	60-136	23
Isopropylbenzene	0.011	0.038	2200	1.3	67-119	12
m & p-Xylene	0.022	0.072	4500	1.6	79-126	24
Methyl tert-butyl ether	0.011	0.038	39	0.0027	68-125	26
Methylene chloride	0.011	0.037	11	0.0012	35-146	24
Naphthalene	0.012	0.041	3.9	0.00055	73-127	14
n-Butylbenzene	0.013	0.043	3900	2.5	73-122	14
n-Propylbenzene	0.014	0.048	3400	0.99	57-142	44
o-Xylene	0.012	0.040	5300	1.6	79-125	24
p-Isopropyltoluene	0.012	0.039	ns	ns	75-121	14
sec-Butylbenzene	0.014	0.045	ns	ns	76-122	15
Styrene	0.009	0.031	6500	2.0	80-118	14
Tert-Butylbenzene	0.011	0.038	ns	ns	77-118	14
Tetrachloroethene	0.018	0.061	0.57	0.000052	71-122	13
Tetrahydrofuran	0.14	0.48	18000	0.71	69-127	24
Toluene	0.011	0.037	5000	1.7	79-124	24
trans-1,2-Dichloroethene	0.014	0.048	110	0.034	64-131	22
trans-1,3-Dichloropropene	0.009	0.029	ns	ns	68-109	16
Trichloroethene	0.006	0.020	2.8	0.00061	67-130	14
Trichlorofluoromethane	0.015	0.051	800	0.84	54-145	24
Vinyl chloride	0.012	0.041	0.06	0.0000056	68-136	17

Compound List, Quantitation Limits, and Standards
CT Laboratories
PCB's 8082 (mg/Kg)
Soil

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
			Resident Soil	Migration to GW		
Arochlor 1016	0.01	0.035	3.9	0.052	48-151	40
Arochlor 1221	0.02	0.066	0.17	0.00014	N/A	N/A
Arochlor 1232	0.027	0.09	0.17	0.00014	N/A	N/A
Arochlor 1242	0.029	0.096	0.22	0.003	N/A	N/A
Arochlor 1248	0.029	0.097	0.22	0.003	N/A	N/A
Arochlor 1254	0.023	0.076	0.22	0.0051	N/A	N/A
Arochlor 1260	0.012	0.038	0.22	0.014	51-143	38

Table 5 (continued)
Compound List, Quantitation Limits and Standards
CT Laboratories
SVOC 8270 (mg/Kg)
Soil

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
			Resident Soil	Migration to GW		
1,2,4,5-Tetrachlorobenzene	0.022	0.074	18	0.028	24-99	20
1,2,4-Trichlorobenzene	0.021	0.069	87	0.013	1-107	20
1,2-Dichlorobenzene	0.024	0.079	2000	0.4	25-91	20
1,2-Diphenylhydrazine	0.055	0.18	0.61	0.0006	9-131	20
1,3-Dichlorobenzene	0.020	0.067	ns	ns	22-91	20
1,4-Dichlorobenzene	0.019	0.063	2.6	0.00046	25-85	20
2,4,5-Trichlorophenol	0.13	0.44	6100	9.4	7-126	20
2,4,6-Trichlorophenol	0.13	0.44	44	0.016	4-104	20
2,4-Dichlorophenol	0.12	0.41	1200	1.2	23-92	20
2,4-Dimethylphenol	0.099	0.33	1200	1.2	1-108	20
2,4-Dinitrophenol	0.69	2.3	1200	0.068	1-123	20
2,4-Dinitrotoluene	0.024	0.079	1200	0.068	7-128	20
2,6-Dichlorophenol	0.14	0.48	37	0.036	5-94	20
2,6-Dinitrotoluene	0.024	0.081	61	0.034	1-126	20
2-Chloronaphthalene	0.023	0.076	6300	18	7-113	20
2-Chlorophenol	0.34	1.1	3900	0.2	24-92	20
2-Methylnaphthalene	0.025	0.083	310	0.9	15-116	20
2-Methylphenol	0.42	1.4	3100	2.0	24-86	20
2-Nitroaniline	0.023	0.078	610	0.062	6-122	20
2-Nitrophenol	0.28	0.94	ns	ns	27-92	20
3 & 4-Methylphenol	0.65	2.2	3100	1.9	20-90	20
3,3'-Dichlorobenzidine	0.15	0.49	1.1	0.0023	30-95	20
3-Nitroaniline	0.022	0.072	18	0.00097	10-113	20
4,6-Dinitro-2-methylphenol	0.27	0.90	6.1	0.0051	1-136	20
4-Bromophenyl-phenyl ether	0.025	0.083	ns	ns	14-122	20
4-Chloro-3-methylphenol	0.38	1.3	ns	ns	9-100	20
4-Chloroaniline	0.039	0.13	9.0	0.00043	1-100	20
4-Chlorophenyl-phenyl ether	0.026	0.087	ns	ns	12-115	20
4-Nitroaniline	0.030	0.10	23	0.00097	1-140	20
4-Nitrophenol	0.40	1.3	ns	ns	1-138	20
Acenaphthene	0.024	0.080	3400	27	12-112	20
Acenaphthylene	0.024	0.081	ns	ns	22-106	20
Acetophenone	0.075	0.25	7800	1.1	25-96	20
Aniline	0.031	0.10	85	0.0034	12-63	20
Anthracene	0.024	0.081	17000	450	30-112	20
Benzidine	0.95	3.2	0.00050	5.3E-7	1-138	20
Benzo(a)anthracene	0.025	0.084	0.15	0.0014	35-134	20
Benzo(a)pyrene	0.023	0.078	0.015	0.0046	46-128	20
Benzo(b)fluoranthene	0.025	0.085	0.15	0.047	19-141	20
Benzo(g,h,i)perylene	0.022	0.073	ns	ns	26-153	20

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
			Resident Soil	Migration to GW		
Benzo(k)fluoranthene	0.025	0.085	1.5	0.46	41-134	20
Benzyl alcohol	0.083	0.28	31000	4.2	1-138	20
Bis(2-chloroethoxy)methane	0.023	0.076	180	0.011	22-92	20
Bis(2-chloroethyl)ether	0.025	0.084	0.19	2.7E-6	26-100	20
Bis(2-chloroisopropyl)ether	0.030	0.099	3.5	0.00009	16-117	20
Bis(2-ethylhexyl)phthalate	0.087	0.29	35	1.6	46-138	20
Butylbenzylphthalate	0.073	0.24	260	0.67	48-135	20
Carbazole	0.028	0.094	ns	ns	40-126	20
Chrysene	0.025	0.084	15	1.4	30-139	20
Dibenzo(a,h)anthracene	0.022	0.075	0.015	0.015	28-146	20
Dibenzofuran	0.024	0.081	78	0.11	8-108	20
Diethylphthalate	0.064	0.22	49000	13	22-125	20
Dimethylphthalate	0.063	0.21	ns	Ns	16-117	20
Di-n-butylphthalate	0.079	0.265	6100	11	47-126	20
Di-n-octylphthalate	0.059	0.20	ns	ns	51-131	20
Fluoranthene	0.026	0.086	2300	210	37-141	20
Fluorene	0.025	0.085	2300	33	8-117	20
Hexachlorobenzene	0.028	0.094	0.3	0.00029	30-114	20
Hexachlorobutadiene	0.062	0.21	6.2	0.0019	27-90	20
Hexachlorocyclopentadiene	0.052	0.17	370	0.8	8-103	20
Hexachloroethane	0.033	0.11	35	0.0032	25-82	20
Hexachloropropene	0.022	0.072	ns	ns	20-89	20
Indeno(1,2,3-cd)pyrene	0.023	0.075	0.15	0.16	40-143	20
Isophorone	0.050	0.17	510	0.022	18-103	20
Naphthalene	0.021	0.071	3.9	0.00055	31-89	20
Nitrobenzene	0.059	0.20	31	0.002	21-106	20
N-Nitrosodimethylamine	0.078	0.26	0.0023	1.20E-7	24-86	20
N-Nitroso-di-n-propylamine	0.070	0.23	0.069	0.000011	24-97	20
N-Nitrosodiphenylamine	0.050	0.17	99	0.17	19-133	20
N-Nitrosopyrrolidine	0.056	0.19	0.23	0.000017	24-97	20
Pentachlorophenol	0.24	0.80	3.0	0.0039	13-127	20
Phenanthrene	0.026	0.088	ns	ns	25-129	20
Phenol	0.16	0.53	18000	8.10	13-100	20
Pyrene	0.026	0.086	1700	150	42-130	20
Pyridine	0.039	0.13	78	0.0097	1-63	20

ns No standard established
mg/Kg Standards reported as milligrams per kilogram, equivalent to parts per million (ppm)
RSL USEPA Region 9 Regional Screening Level (November 2011). RSLs listed are based on residential direct contact pathway. The RSLs contained in the table are generic, and should be viewed as screening guidelines, not legally enforceable standards.

Table 5 (continued)
Compound List, Quantitation Limits, and Standards
TestAmerica, Arvada, CO
Herbicides 8151 (ug/Kg)
Soil

Analytes	Current Reporting Limits	Current LOQ	WDEQ (mg/Kg)		MS/MSD %R	MS/MSD %RPD
			Resident Soil	Migration to GW		
2,4,5-T	2.3	20	610	0.11	24-115	40
2,4,5-TP (Silvex)	1.4	20	490	0.11	53-134	40
2,4-D	14	80	690	0.094	32-115	40
2,4-DB	7.46	80	490	4900	37-119	50
Dicamba	1.4	40	1800	0.28	11-115	50
Dichlorprop	3.2	80	ns	ns	35-115	50
Dinoseb	1.4	12	61	0.27	5-166	50
MCPA	2000	8000	31	0.0047	37-115	50

Table 6
Compound List, Quantitation Limits and Standards
CT Laboratories
ICP (µg/L) - Groundwater

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Aluminum	6010C	5	16	36500	72-145	20
Antimony	6010C	4	14	6.0	79-122	12
Barium	6010C	0.3	1.1	2000	78-115	17
Beryllium	6010C	0.13	0.45	4.0	79-107	10
Cadmium	6010C	0.12	0.4	5.0	80-108	13
Calcium	6010C	11	38	ns	73-116	24
Chromium	6010C	0.8	2.6	100	80-112	13
Cobalt	6010C	0.9	2.8	10.9	81-114	8
Copper	6010C	3.0	9.9	1300	89-116	11
Iron	6010C	5	17	25500	72-113	18
Lead	6010C	1.4	4.7	15	84-117	17
Magnesium	6010C	2.2	7.3	ns	73-115	20
Manganese	6010C	0.5	1.5	50	67-121	13
Nickel	6010C	0.8	2.5	729	78-121	11
Potassium	6010C	110	360	ns	72-139	20
Selenium	6010C	4	14	50	79-128	9
Silver	6010C	1	3.2	100	58-142	17
Sodium	6010C	120	410	ns	80-110	19
Thallium	6010C	4	15	2.0	93-116	9
Vanadium	6010C	0.6	1.9	255	87-113	10
Zinc	6010C	1.1	3.6	5000	81-114	13

Arsenic (µg/L) - Groundwater

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Arsenic	7010	0.8	2.8	10	75-125	20

Table 6 (continued)
Compound List, Quantitation Limits and Standards
CT Laboratories

Hexavalent Chromium (µg/L) - Groundwater

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Chromium $^{+6}$	7196A	6	21	109	63-127	20

Mercury (µg/L) - Groundwater

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Mercury	7470	0.016	0.053	2.0	78-119	16

Cyanide (µg/L) – Groundwater

Analytes	Analytical Method	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Cyanide	9012A	6	21	200	53-152	32

ns	No standard established for this parameter
µg/L	Standards reported as micrograms per liter, equivalent to parts per billion (ppb), except as noted
Reporting Limit	Lowest level that can be reliably achieved within specified limits of precision and accuracy (not statistically derived).
Limit of Quantitation	Lowest quantity of a substance that can be distinguished from the absence of that substance (blank value) within a 99% probability (statistical calculation).

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
CT Laboratories
PAH 8310 (µg/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
1-Methylnaphthalene	0.4	1.3	ns	44-105	20
2-Methylnaphthalene	0.5	1.5	146	44-106	20
Acenaphthene	0.5	1.6	2190	42-114	20
Acenaphthylene	0.5	1.6	ns	38-115	20
Anthracene	0.15	0.5	10900	47-107	20
Benzo(a)anthracene	0.016	0.054	0.117	42-113	20
Benzo(a)pyrene	0.04	0.14	0.20	39-111	20
Benzo(b)fluoranthene	0.03	0.1	0.117	42-107	20
Benzo(g,h,i)perylene	0.06	0.21	60	32-103	20
Benzo(k)fluoranthene	0.018	0.061	0.117	40-108	20
Chrysene	0.08	0.28	0.117	50-108	20
Dibenzo(a,h)anthracene	0.09	0.31	0.0117	34-101	20
Fluoranthene	0.024	0.079	1460	44-107	20
Fluorene	0.26	0.87	1460	45-106	20
Indeno(1,2,3-cd)pyrene	0.05	0.15	0.117	26-106	20
Naphthalene	0.5	1.6	729	40-107	20
Phenanthrene	0.11	0.38	ns	49-106	20
Pyrene	0.12	0.4	1090	49-109	20

ns No standard established for this parameter
µg/L Standards reported as micrograms per liter, equivalent to parts per billion (ppb)

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
CT Laboratories
Petroleum 8015C (µg/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Gasoline Range Organics (GRO)	0.4	1.3	7300	62-127	11
Diesel Range Organics (DRO)	44	147	1100a or 10000b	35-134	29

ns No standard established for this parameter
µg/L Standards reported as micrograms per liter, equivalent to parts per billion (ppb)
a/b variable depending on < or > MCL and presence of free product (see WDEQ regs)

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
CT Laboratories

VOC 8260 (µg/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
1,1,1,2-Tetrachloroethane	0.4	1.4	3.27	70-130	20
1,1,1-Trichloroethane	0.29	0.96	200	76-142	23
1,1,2,2-Tetrachloroethane	0.3	1.1	0.425	70-130	20
1,1,2-Trichloroethane	0.4	1.2	5.0	79-128	17
1,1-Dichloroethane	0.3	1.1	7290	70-130	20
1,1-Dichloroethene	0.24	0.79	7.0	64-154	28
1,1-Dichloropropene	0.4	1.3	ns	70-130	20
1,2,3-Trichlorobenzene	0.4	1.4	ns	58-145	42
1,2,3-Trichloropropane	0.4	1.2	219	70-130	20
1,2,4-Trichlorobenzene	0.4	1.2	70	61-136	32
1,2,4-Trimethylbenzene	0.4	1.2	365	70-130	20
1,2-Dibromo-3-chloropropane	0.4	1.3	0.2	57-144	38
1,2-Dibromoethane	0.3	1.0	0.05	70-130	20
1,2-Dichlorobenzene	0.4	1.2	600	81-123	15
1,2-Dichloroethane	0.30	1.00	5.0	70-130	20
1,2-Dichloropropane	0.4	1.3	5.0	80-128	17
1,3,5-Trimethylbenzene	0.4	1.4	1820	70-130	20
1,3-Dichlorobenzene	0.3	1.1	320	81-123	14
1,3-Dichloropropane	0.29	0.98	729	70-130	20
1,4-Dichlorobenzene	0.3	1.1	75	79-122	15
2,2-Dichloropropane	0.3	1.0	ns	70-130	20
2-Butanone	4	13	21900	59-146	31
2-Chlorotoluene	0.3	1.1	729	70-130	20
2-Hexanone	4	13	ns	54-155	34
4-Chlorotoluene	0.29	0.95	2550	70-130	20
4-Methyl-2-pentanone	4	12	2920	56-156	29
Acetone	2.9	9.6	32800	70-130	20
Benzene	0.3	1.0	5.0	82-131	17
Bromobenzene	0.3	1.1	729	85-121	10
Bromodichloromethane	0.3	1.0	80	70-130	20
Bromoform	0.3	1.1	80	58-129	26
Bromomethane	0.3	1.0	51	70-130	20
Carbon Disulfide	0.5	1.7	3650	41-156	41
Carbon tetrachloride	0.27	0.90	5.0	70-130	20
Chlorobenzene	0.28	0.95	100	82-114	17
Chlorodibromomethane	0.3	1.0	80	68-128	18
Chloroethane	0.3	1.1	ns	70-130	20
Chloroform	0.23	0.77	80	79-134	18
Chloromethane	0.27	0.89	ns	70-130	20

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	*MS/MSD %RPD*
cis-1,2-Dichloroethene	0.3	1.1	70	81-129	18
cis-1,3-Dichloropropene	0.26	0.87	ns	70-130	20
Dichlorodifluoromethane	0.4	1.3	7290	58-165	16
Diisopropyl ether	0.3	1.0	ns	65-142	17
Ethylbenzene	0.3	1.0	700	78-127	14
Hexachlorobutadiene	0.5	1.6	1.09	56-156	23
Isopropylbenzene	0.3	1.1	3600	69-127	16
m & p-Xylene	0.6	2.2	72900	71-134	15
Methyl tert-butyl ether	0.4	1.2	47.3	60-143	20
Methylene chloride	0.4	1.3	5.0	58-150	26
Naphthalene	0.4	1.4	729	72-134	15
n-Butylbenzene	0.4	1.3	ns	77-130	17
n-Propylbenzene	0.3	1.1	ns	53-160	33
o-Xylene	0.3	1.0	72900	74-127	15
p-Isopropyltoluene	0.4	1.2	ns	71-130	14
sec-Butylbenzene	0.3	1.0	ns	75-134	17
Styrene	0.27	0.89	100	51-136	19
Tert-Butylbenzene	0.4	1.3	ns	77-130	20
Tetrachloroethene	0.29	0.96	5.0	78-128	15
Tetrahydrofuran	3	11	ns	54-150	32
Toluene	0.30	0.98	1000	81-128	14
trans-1,2-Dichloroethene	0.3	1.1	100	79-135	23
trans-1,3-Dichloropropene	0.3	1.1	ns	67-118	15
Trichloroethene	0.5	1.6	5.0	73-135	21
Trichlorofluoromethane	0.3	1.1	10900	70-130	20
Vinyl chloride	0.18	0.61	2.0	67-157	18

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
CT Laboratories
PCB's 8082 (ug/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Arochlor 1016	0.113	0.378	0.5	53-130	29
Arochlor 1221	0.085	0.285	0.5	N/A	N/A
Arochlor 1232	0.145	0.485	0.5	N/A	N/A
Arochlor 1242	0.096	0.32	0.5	N/A	N/A
Arochlor 1248	0.088	0.295	0.5	N/A	N/A
Arochlor 1254	0.094	0.312	0.5	N/A	N/A
Arochlor 1260	0.099	0.331	0.5	55-132	28

ns No standard established for this parameter
µg/L Standards reported as micrograms per liter, equivalent to parts per billion (ppb), except as noted

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
CT Laboratories
SVOC 8270 (µg/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
1,2,4,5-Tetrachlorobenzene	0.42	1.31	10.9	46-123	25
1,2,4-Trichlorobenzene	0.30	1.00	70	44-106	31
1,2-Dichlorobenzene	0.31	0.99	600	28-116	27
1,2-Diphenylhydrazine	0.53	1.80	0.106	55-113	17
1,3-Dichlorobenzene	0.31	0.99	320	29-114	28
1,4-Dichlorobenzene	0.34	1.10	75	37-103	28
2,4,5-Trichlorophenol	1.43	4.80	3650	37-139	40
2,4,6-Trichlorophenol	1.24	4.10	7.73	20-135	46
2,4-Dichlorophenol	1.10	3.50	109	54-112	32
2,4-Dimethylphenol	1.36	4.40	729	3-151	55
2,4-Dinitrophenol	0.90	2.90	72.9	1-148	50
2,4-Dinitrotoluene	0.30	1.00	72.9	51-129	21
2,6-Dichlorophenol	1.30	4.10	ns	36-125	46
2,6-Dinitrotoluene	0.29	0.93	36.5	61-133	21
2-Chloronaphthalene	0.35	1.10	2920	46-114	25
2-Chlorophenol	1.14	3.60	182	56-110	25
2-Methylnaphthalene	0.31	1.00	146	36-107	25
2-Methylphenol	1.00	3.20	1820	30-127	35
2-Naphthylamine	1.59	5.29	ns	4-176	52
2-Nitroaniline	0.35	1.20	ns	40-149	21
2-Nitrophenol	1.10	3.70	ns	52-116	30
3 & 4-Methylphenol	1.70	5.40	1820	1-158	38
3,3'-Dichlorobenzidine	0.66	2.2	0.189	3-148	29
3-Nitroaniline	0.39	1.30	ns	36-132	32
4,6-Dinitro-2-methylphenol	1.30	4.20	3.65	1-164	41
4-Bromophenyl-phenyl ether	0.27	0.87	ns	59-118	18
4-Chloro-3-methylphenol	1.20	3.80	3000	19-139	34
4-Chloroaniline	0.74	2.40	146	21-134	31
4-Chlorophenyl-phenyl ether	0.31	0.98	ns	57-121	20
4-Nitroaniline	0.30	1.00	4.25	26-142	21
4-Nitrophenol	0.57	1.90	ns	1-141	49
Acenaphthene	0.26	0.82	2190	49-126	25
Acenaphthylene	0.28	0.88	ns	50-121	24
Acetophenone	0.27	0.87	3650	38-141	27
Aniline	0.77	2.60	14.9	1-132	48
Anthracene	0.23	0.72	10900	57-131	14
Benzidine	29.47	98.23	0.00037	1-163	50
Benzo(a)anthracene	0.19	0.63	0.117	50-130	16
Benzo(a)pyrene	0.32	1.10	0.2	42-138	19
Benzo(b)fluoranthene	0.23	0.77	0.117	40-135	23

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
Benzo(g,h,i)perylene	0.24	0.80	60	20-148	24
Benzo(k)fluoranthene	0.32	1.10	0.117	44-140	23
Benzyl alcohol	0.26	0.83	18200	31-134	28
Bis(2-chloroethoxy)methane	0.30	0.96	ns	53-119	27
Bis(2-chloroethyl)ether	0.30	0.84	0.0773	48-116	29
Bis(2-chloroisopropyl)ether	0.37	1.20	1400	46-129	27
Bis(2-ethylhexyl)phthalate	0.75	2.50	6.0	32-156	36
Butylbenzylphthalate	0.18	0.59	7290	48-142	17
Carbazole	0.20	0.64	ns	51-128	19
Chrysene	0.20	0.64	11.7	34-138	16
Dibenzo(a,h)anthracene	0.23	0.73	0.0117	15-148	22
Dibenzofuran	0.26	0.86	ns	49-114	23
Diethylphthalate	0.28	0.92	29200	58-135	18
Dimethylphthalate	0.27	0.86	270000	41-132	20
Di-n-butylphthalate	0.22	0.71	3650	61-137	23
Di-n-octylphthalate	0.49	1.6	ns	18-159	27
Fluoranthene	0.18	0.56	1460	49-126	15
Fluorene	0.26	0.82	1460	50-130	20
Hexachlorobenzene	0.22	0.73	1.0	54-119	18
Hexachlorobutadiene	0.31	0.98	1.09	34-109	38
Hexachlorocyclopentadiene	0.32	1.00	50	10-140	34
Hexachloroethane	0.35	1.10	6.08	27-121	33
Hexachloropropene	0.13	0.45	ns	18-135	30
Indeno(1,2,3-cd)pyrene	0.19	0.60	0.117	16-143	24
Isophorone	0.22	0.74	89.5	53-109	28
Naphthalene	0.31	0.98	729	40-122	29
Nitrobenzene	0.31	1.00	72.9	40-127	31
N-Nitrosodimethylamine	0.59	2.00	0.00167	39-121	28
N-Nitroso-di-n-propylamine	0.29	0.97	0.0122	32-145	25
N-Nitrosodiphenylamine	0.44	1.40	17.4	34-135	25
N-Nitrosopyrrolidine	0.22	0.70	0.0405	51-119	26
Pentachlorophenol	1.13	3.60	1.0	1-147	33
Phenanthrene	0.20	0.64	ns	50-130	13
Phenol	0.52	1.70	10900	1-126	41
Pyrene	0.19	0.61	1090	52-133	15
Pyridine	0.64	2.10	36.5	1-115	54

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
CT Laboratories
Pesticides 8081 (µg/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
4,4'-DDD	0.006	0.020	0.354	56-142	34
4,4'-DDE	0.006	0.020	0.25	53-139	25
4,4'-DDT	0.007	0.022	0.25	50-150	28
Aldrin	0.005	0.016	0.005	60-134	24
a-BHC	0.009	0.030	0.0473	59-137	24
a-Chlordane	0.006	0.017	2.0	57-130	23
b-BHC	0.009	0.030	0.0473	59-139	30
d-BHC	0.005	0.017	ns	27-140	23
Dieldrin	0.006	0.018	0.00532	58-143	27
Endosulfan I	0.009	0.028	62	63-140	32
Endosulfan II	0.007	0.022	62	62-142	25
Endosulfan Sulfate	0.006	0.020	62	46-144	33
Endrin	0.006	0.020	2.0	54-158	23
Endrin Aldehyde	0.009	0.028	0.29	58-135	36
Endrin Ketone	0.007	0.021	ns	61-141	28
g-BHC	0.007	0.022	0.2	57-137	29
g-Chlordane	0.007	0.024	ns	56-142	24
Heptachlor	0.006	0.019	0.4	64-134	29
Heptachlor Epoxide	0.007	0.021	0.2	62-138	25
4,4'-Methoxychlor	0.006	0.020	ns	51-152	28
Toxaphene	0.176	0.562	3.0	N/A	N/A

Table 6 (continued)
Compound List, Quantitation Limits, and Standards
TestAmerica, Arvada, CO
Herbicides 8151 (µg/L)
Groundwater

Analytes	Current Reporting Limits	Current LOQ	WDEQ Cleanup (µg/L)	MS/MSD %R	MS/MSD %RPD
2,4,5-T	0.19	1.0	365	29-168	30
2,4,5-TP Silvex	0.17	1.0	50	45-165	30
2,4-D	0.21	4.0	70	15-140	30
2,4,-DB	0.36	4.0	ns	63-148	30
Dicamba	0.15	2.0	1090	53-153	30
Dichloroprop	0.65	4.0	ns	39-136	30
Dinoseb	0.18	1.0	7.0	10-142	30
MCPA	17	400	18.2	50-150	30

Table 7
Compound List, Quantitation Limits, and Standards
Pace Laboratories
TO-15 Air

					LCS		DUP	EPA RSL
Analyte	CAS #	MDL (ppbv)	PRL (ppbv)	PRL (ug/m^3)	Lower	Upper	RPD	(ug/m3)
1,1,1-Trichloroethane	71-55-6	0.250	0.5	2.78	72	129	25	5200
1,1,2,2-Tetrachlorethane	79-34-5	0.027	0.5	1.75	73	131	25	0.042
1,1,2-Trichloroethane	79-00-5	0.250	0.5	1.38	71	128	25	0.15
1,1,2-Trichlorotrifluoroethane	76-13-1	0.250	0.5	9.73	65	132	25	31000
1,1-Dichloroethane	75-34-3	0.250	0.5	2.06	67	132	25	1.5
1,1-Dichloroethene	75-35-4	0.250	0.5	2.02	68	134	25	210
1,2,4-Trichlorobenzene	95-63-6	0.250	0.5	2.48	48	150	25	2.1
1,2,4-Trimethylbenzene	95-63-6	0.250	0.5	6.25	72	127	25	7.3
1,2-Dibromoethane (EDB)	106-93-4	0.250	0.5	3.90	75	130	25	0.0041
1,2-Dichlorobenzene	95-50-1	0.250	0.5	3.05	71	132	25	210
1,2-Dichloroethane	107-06-2	0.250	0.5	1.03	70	131	25	0.094
1,2-Dichloropropane	78-87-5	0.250	0.5	2.35	73	130	25	0.24
1,3,5-Trimethylbenzene	108-67-8	0.026	0.5	6.25	70	133	25	7.3
1,3-Butadiene	106-99-0	0.250	0.5	1.13	69	132	25	0.081
1,3-Dichlorobenzene	541-73-1	0.250	0.5	3.05	71	128	25	ns
1,4-Dichlorobenzene	106-46-7	0.250	0.5	3.05	72	131	25	0.22
2-Butanone (MEK)	78-93-3	0.052	0.5	1.50	69	131	25	5200
2-Hexanone	591-78-6	0.250	0.5	1.83	71	134	25	31
4-Ethyltoluene	622-96-8	0.250	0.5	2.50	71	129	25	ns
4-Methyl-2-pentanone (MIBK)	108-10-1	0.250	0.5	2.08	69	135	25	3100
Acetone	67-64-1	0.250	0.5	1.21	61	139	25	32000
Benzene	71-43-2	0.250	0.5	0.88	69	134	25	0.31
Bromodichloromethane	75-27-4	0.026	0.5	3.41	71	130	25	42
Bromoform	75-25-2	0.250	0.5	5.25	70	130	25	2.2
Bromomethane	74-83-9	0.046	0.5	1.97	69	125	25	5.2
Carbon disulfide	75-15-0	0.250	0.5	1.58	66	131	25	730
Carbon Tetrachloride	56-23-5	0.250	0.5	1.60	68	128	25	0.41

Analyte	CAS #	MDL (ppbv)	PRL (ppbv)	PRL (ug/m^3)	LCS Lower	LCS Upper	DUP RPD	EPA RSL (ug/m3)
Chlorobenzene	108-90-7	0.250	0.5	2.34	75	128	25	52
Chloroethane	75-00-3	0.250	0.5	1.34	66	131	25	10000
Chloroform	67-66-3	0.250	0.5	2.48	68	132	25	0.11
Chloromethane	74-87-3	0.250	0.5	1.05	60	139	25	94
cis-1,2-Dichloroethene	156-59-2	0.038	0.5	2.02	73	130	25	ns
cis-1,3-Dichloropropene	10061-01-5	0.024	0.5	2.31	74	134	25	0.61
Cyclohexane	110-82-7	0.250	0.5	1.75	67	136	25	6300
Dibromochloromethane	124-48-1	0.250	0.5	4.33	69	131	25	0.09
Dichlorodifluoromethane	75-71-8	0.250	0.5	2.53	67	131	25	100
Dichlorotetrafluorethane (Freon 114)	76-14-2	0.030	0.5	3.55	66	130	25	ns
Ethyl acetate	141-78-6	0.098	0.5	1.83	71	131	25	ns
Ethylbenzene	100-41-4	0.027	0.5	2.20	69	139	25	0.97
Hexachloro-1,3-butadiene	87-68-3	0.250	0.5	5.50	41	150	25	0.11
m&p-Xylene	106-42-3	0.500	1	2.20	66	137	25	100
Methyl-tert-butyl ether	1634-04-4	0.024	0.5	2.08	70	132	25	9.4
Methylene chloride	75-0902	0.250	0.5	1.77	73	134	25	96
Naphthalene	91-20-3	0.250	0.5	2.66	57	150	25	0.072
n-Heptane	142-82-5	0.250	0.5	2.08	70	134	25	ns
n-Hexane	110-54-3	0.250	0.5	1.80	65	133	25	730
o-Xylene	95-47-6	0.029	0.5	2.20	69	138	25	100
Propylene	115-07-1	0.250	0.5	0.88	70	134	25	3100
Styrene	100-42-5	0.250	0.5	2.18	72	132	25	1000
Tetrachloroethene	127-18-4	0.250	0.5	1.73	70	130	25	9.4
Tetrahydrofuran	109-99-9	0.250	0.5	1.50	74	128	25	2100
Toluene	108-88-3	0.250	0.5	1.93	71	132	25	5200
trans-1,2-Dichloroethene	156-60-5	0.250	0.5	2.03	72	128	25	63
trans-1,3-Dichloropropene	10061-02-6	0.250	0.5	2.30	73	130	25	ns
Trichloroethene	79-01-6	0.250	0.5	1.38	72	131	25	0.43
Trichlorofluoromethane	75-69-4	0.039	0.5	2.85	66	129	25	7300
Vinyl acetate	108-05-4	0.250	0.5	1.80	71	131	25	210
Vinyl Chloride	75-01-4	0.050	0.5	0.65	70	131	25	0.16

Table 7 (continued)
Compound List, Quantitation Limits, and Standards
Pace Laboratories
Paint Chips

				LCS/LCSD			MS/MSD			DUP
Analyte	**CAS#**	**MDL (mg/Kg)**	**PRL (mg/Kg)**	**Lower**	**Upper**	**RPD**	**Lower**	**Upper**	**RPD**	**RPD**
Lead	7439-92-1	0.05	0.30	80	120	20	75	125	30	30

Figures

Image Provided by ESRI

AYRES ASSOCIATES

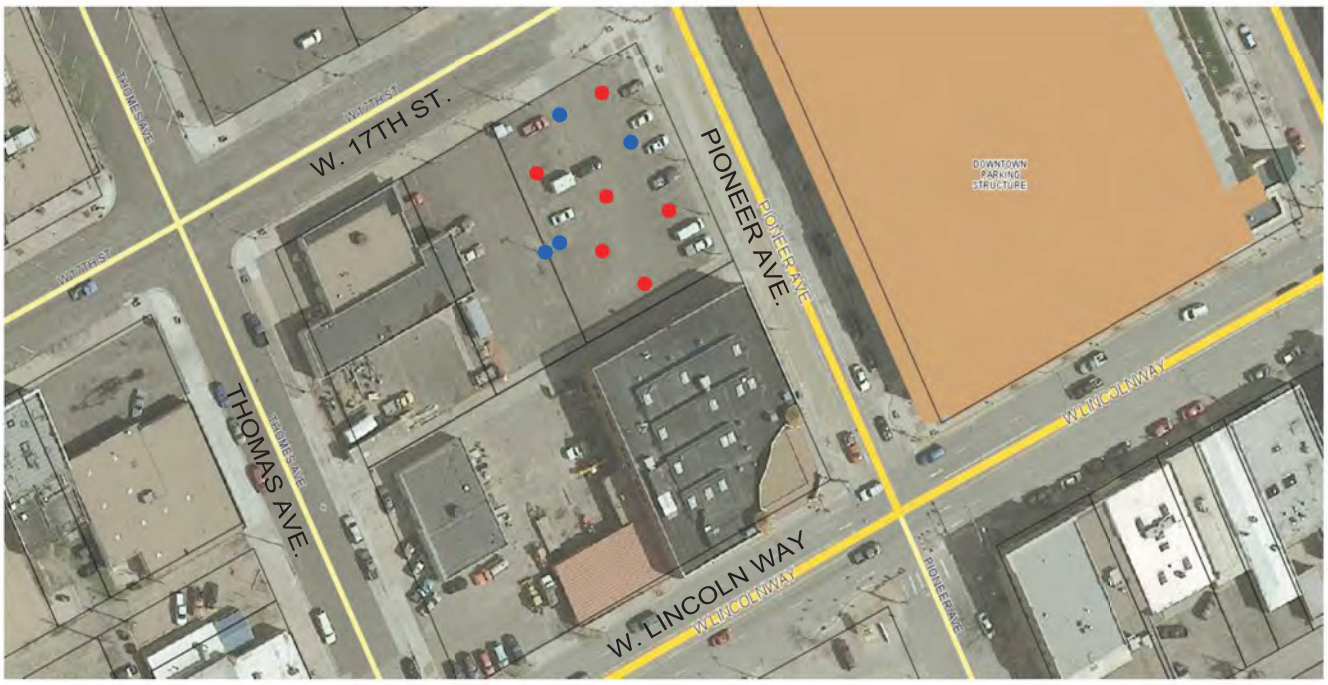
Figure 1 - Site Location Map
17th Street Dinneen
517 West 17th Street
Cheyenne, WY 82003

PREPARED FOR: City of Cheyenne
PROJ. MGR: Scott Wilson **DATE: 06/21/2013**
DRAWN BY: Ryan Shimko **PROJ. #: 19-0325.40**

NORTH

LEGEND

- SOIL PROBE
- MONITORING WELL



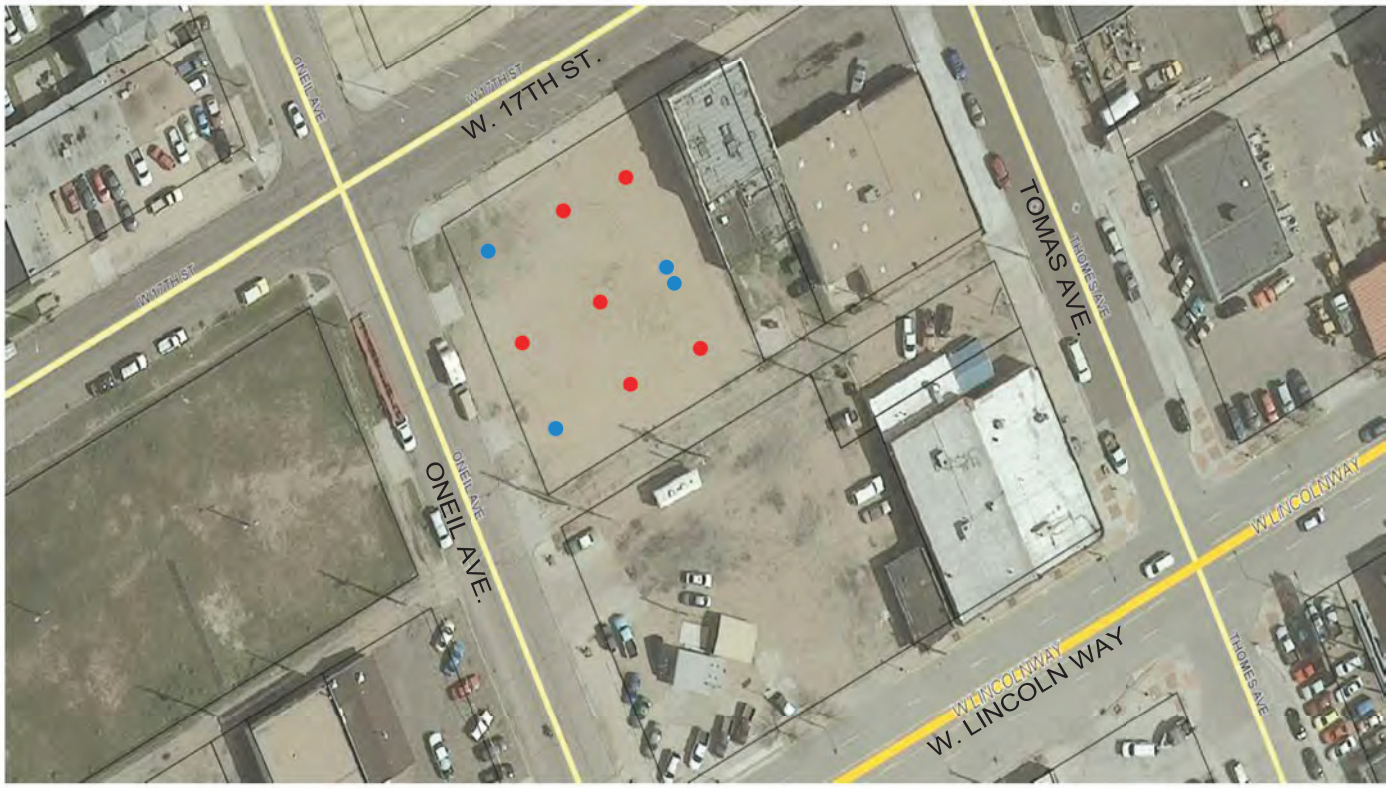
9/17/2013
FileDate.tbl
V:\ENV\CAD\Cheyenne\Fig 2.DGN

DR.BY T.SHUPERT CHK.BY J.STEINER DATE SEPTEMBER 2013	1620 PIONEER AVE. CHEYENE: WEST EDGE CHEYENNE, WYOMING	AYRES ASSOCIATES Eau Claire, Wisconsin	SOIL PROBE AND MONITORING WELL LOCATIONS	FIGURE NO. 2 SHEET __ OF __

NORTH

LEGEND

- SOIL PROBE
- MONITORING WELL



DR.BY T.SHUPERT CHK.BY J.STEINER DATE SEPTEMBER 2013	517 17TH STREET CHEYENE: WEST EDGE CHEYENNE, WYOMING	AYRES ASSOCIATES Eau Claire, Wisconsin	SOIL PROBE AND MONITORING WELL LOCATIONS	FIGURE NO. 3 SHEET __ OF __

9/17/2013
FileDate.tbl
V:\ENV\CAD\Cheyenne\Fig 3.DGN

LEGEND

- SOIL PROBE
- MONITORING WELL